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PURPOSIVE BEHAVIOR, THE FOUNDATION OF LEARNING

By

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DEDICATED

TO

FOUR GREAT TEACHERS

T. J. C.
S. M. C.
T. L. W.
N. C. W.

INTRODUCTION

The subject matter of paramount interest to the teacher is the purposive behavior of boys and girls. The teacher is concerned with what the pupils are *doing* at any given time. As an illustration of this type of behavior let us observe what John is doing in the work shop of the school. He has collected a varied assortment of tools and equipment, including a screw driver, pliers, knife, tape, wire, condensers, tuning coil, detector, switch key, head phones, etc. The material is manipulated and assembled in an orderly way. He works intently at his task. He pays little attention to others in the shop. No heed is given to the noises produced by the motors and other machinery. In other words, his behavior is so organized as to lead to the achievement of some goal. By observing this behavior for a short period of time, we shall discover that John is constructing a radio receiving set, possibly to be entered in the construction contest being fostered by some business firm during Boy Scout Week.

Now it is this and other forms of purposive behavior that engage the time and interest of the teacher, for it is through such behavior that boys and girls grow. The teacher for this reason must be a constant student of the behavior of boys and girls. First, she must have a dynamic point of view. She must understand that behavior of some kind along some line is the basis of all life. Second, she must recognize the fact that boys and girls, in common with all living things, grow in and through their own behavior. She must understand that learning, growth, education take place at the time the activities of boys and girls are under way. Third, she must recognize the fact that the behavior of boys and girls, in common with the behavior of all living things, depends upon stimulation and direction of some kind. She must understand how to provide stimulation and direction conducive to changes in the behavior of boys and girls.

The study embodied in the present volume, it is hoped, will enlighten teachers and enable them to improve their work in these three respects. An effort is made particularly to give teachers a better insight into the process of growth in boys and girls and how to stimulate and guide the process in actual school situations. These are the present needs of all teachers interested in the education of children.

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PART I

EDUCATION IN TERMS OF PURPOSIVE BEHAVIOR

PSYCHOLOGY FOR TEACHERS

CHAPTER I

PURPOSIVE BEHAVIOR THE BASIS OF LIVING THINGS

1. The Dynamic Nature of Living Things. The main difference between a dead body and one that is living lies in the fact that the dead body is disintegrated and destroyed by the forces of the surrounding environment, while the living body responds to these forces and thereby improves its welfare. The corpse is inactive; the living body is constantly doing something to its environment. It is either modifying its physical surroundings or it is adapting its own behavior so as to supply most effectively its individual needs under the conditions as they exist. This seems to be true of all living matter. As Sir Oliver Lodge has said, one would be astonished if one knew all of the things that are happening in a stagnant pond, in a tumbler of water, in one's own body. All particles are in a state of motion; nothing is at rest. This state of activity can be readily seen with a powerful microscope. All living things are responsive agents to stimulation along some particular line of activity. This dynamic nature of life is present throughout the entire range of living things, whether it be the lowly amœba or the boy or girl of the classroom.

In defining life in this connection, Herrick[1] states that, "Life is a system of forces maintained by a continuous inter-

[1] Herrick, C. J. An Introduction to Neurology, p. 18, 1918. By permission of W. B. Saunders Co.

change of energy between the system and its environment, these forces being so correlated as to conserve the identity of the system as an individual and propagate it."

All vital phenomena are essentially dynamic, according to Jennings.[2] "It is of the very greatest importance for the understanding of the behavior of organisms, to look upon them as something dynamic—as processes rather than structures. An animal is something that happens."

The expression of this dynamic nature of living things can be observed and measured in two ways, according to Herrick: [3] "In the first place, life is measured by the amount of energy which the organism can assimilate from surrounding nature and incorporate into its own organization. This enters the body in the form of chemical potential energy in food eaten, air breathed, and so on, and can be quantitatively determined and stated in the form of standard units of energy, such as calories or foot-pounds of work. In the second place, life may be measured in terms of the extensity or number and diversity of environmental relations. This takes account of the range or working distance of the organization and, in general, of the efficiency of the work done. For the organization which has few and simple relations with the environment, so that it can adjust itself to only a small range of external conditions, is less efficient than one which has many diverse relationships and an extensive series of possible adjustments, even though the actual amount of energy expended may be vastly greater in the former than in the latter case."

It is the latter manifestation of energy in which the teacher is particularly interested. She is concerned with the various kinds of stimulation in the school, in the home, and in the community, to which boys and girls normally are responsive. Likewise she is interested in the mode or manner in which her children react to these stimulating conditions. It is upon this foundation that her program of educating boys and girls must rest. More will be said in later chapters concerning how children can be stimulated and how their responses can be directed toward the development of desirable forms of behavior.

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[2] Quoted in Bayliss, W. M. Principles of General Physiology, p. ix, 1927. By permission of Longmans, Green and Co.

[3] Herrick, C. J. An Introduction to Neurology, p. 18f., 1918. By permission of W. B. Saunders Co.

2. The Basis of the Dynamic Nature of Living Things. The basis of this dynamic nature of life lies in the fact that there is a constant play of interaction between the organism and its environment. On the one hand, the organism has, as will be shown in later chapters, three types of mechanisms which make this interaction possible, namely, organs of stimulation, organs of response, and organs of connection. On the other hand, the environment is made up of a multitude of energies which impinge upon the organs of stimulation. The environment stimulates the organism. The organism in turn reacts upon the environment. Life, then, is a continuous interplay of environmental forces and responses of the organism. The organism is constantly trying to keep in such relation to the environment as will promote its own welfare.

A few statements from students of the problem will make the point more clear. Herbert Spencer is credited with saying that life is "The definite combination of heterogeneous changes, both simultaneous and successive, in correspondence with external coexistences and sequences." Or, expressed differently, it is "the continuous adjustment of internal relations to external relations." And in commenting upon the same point, Bayliss[4] states that, "A system in static equilibrium is dead."

An interesting view in education and psychology holds that complacency is the central factor in human behavior. Raup,[5] who has recently discussed this theory, describes the working relationship between environment and the organism as follows: "From the small globule of protoplasm, called amœba, to the almost infinitely complex organism of the human being, the first and chief business of living matter is to get into such relationship with other forms of matter as to maintain itself relatively constant while taking on their energy, utilizing it, and giving it off. To the farthest and finest reaches of his varied physical and mental life man's whole performance centers in the making and the maintaining of favorable relationships with the objects of his environment. The fact of adjustment between itself and other objects is central in the behavior of the human organism, whether it be physical or mental phenomena that are considered. The organism's experience is one of ceaseless activity, but the central phase in all this activity is what is called adaptation, or adjustment, or maintaining favorable relationships with its environment. From these relationships when disturbed, and back to these or better similar relationships, all behavior moves. All else in behavior is subsidiary to the satisfactory conditions of adjustment with the elements of the individual's environment."

In discussing the adjustment of forces in nature to each other, Ostwald[6] indicates that work is done or an end-result is gained in proportion as these forces are in harmonious relationship with each other. "It is for kinetic energy, velocity; for potential energy, force; for heat, temperature; for electrical energy, electromotive force." This is the idea to be brought out here in connection with the behavior of human beings. Thus, we may say that for the boy or girl the result of the interaction of environmental forces and child-energy is the mastery of a skilled act, the solution of a problem, or the development of an ideal.

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[4] Bayliss, W. M. Principles of Physiology, p. 31, 1927. By permission of Longmans, Green and Co.

[5] Raup, R. B. Complacency: The Foundation of Human Behavior, p. 1f., 1928. By permission of The Macmillan Co.

[6] Quoted in Raup, R. B. Complacency: The Foundation of Human Behavior, p. 22, 1925. By permission of The Macmillan Co.

3. **The Behavior of Living Things Is Purposive.** The behavior of an organism is always pointed toward some end-result. This statement does not imply that the organism is necessarily conscious of the final outcome of its behavior. But at least there is a "behavior-set," a "response-posture," or an "anticipatory attitude" which makes it possible for the animal to keep itself in such relation to its environment as will result in the proper discrimination and selection of stimuli to which it must respond. Frequently, in the case of human beings there is evidence, certainly, of a definitely prearranged mode of attack in order to reach a definitely premeditated goal. Many of the responses are only "preparatory" in orienting the organism in its environment so that it can most effectively make the "consummatory" or final response. But the net result of the whole repertoire of responses of the organism, when it is confronted with a problem, is to bring about an end-result which is beneficial to the organism. An illustration from Woodworth[7] will help to simplify the point in question.

"Suppose you whistle for your dog when he is some distance off and out of sight. Presently the dog swings around the corner and dashes up to you. Now, what kept the dog running toward you after your whistle had ceased and before he caught sight of you? Evidently he was directed toward the end-result of reaching you, and this directing tendency governed his movements during the process. He made many preparatory reactions on the way to his final reaction of jumping up on you; and these preparatory reactions were, of course, responses to the particular trees he had to dodge, and the ditches he had to jump; but they were at the same time governed by the inner state set up in him by your whistle. This inner state favored certain reactions and excluded others that would have occurred if the dog had not been in a hurry. He passed another dog without so much as saying, 'How d'ye do?' And he responded to a fence by leaping over it, instead of trotting around through the gate. That is to say, the inner state set up in him by your whistle *facilitated* reactions that were preparatory to the final reaction, and *inhibited* reactions that were not in that line."

---

[7] Woodworth, R. S. Psychology: A Study of Mental Life, p. 77f., 1921. By permission of Henry Holt and Co.

4. **The Dynamic Nature of the Child.** The child is a living organism and everything that has been said about life in previous paragraphs is equally true of the child. The child is sensitive to a multitude of conditions and forces which are impinging upon it. It is also responsive to these stimulating conditions. A healthy boy or girl is always doing something. This activity can be carried out in multitudinous ways. At one time it may be seen in play, such as running, jumping, riding a bicycle, and the various competitive games. At another time it is in evidence in constructing something, as in making a windmill, a bird house, a doll dress, or a bookcase. Again, it may be seen in the exploration of something novel. The boy explores the cave to see the under-

ground streams, the giant columns of calcium deposits, and to experience the coolness of its darkened chambers. Or, he visits the ice plant to determine how ice is made, the candy shop to observe the process of candy-making, and the stock show to look at the fine animals on exhibition. At still another time it is observed in the communicative responses of children. They tell stories, write letters, draw pictures, and read books. Finally, it can be seen in the development of skills, such as learning to play the piano, operate the typewriter, or sing a song. But in all of these lines of behavior there is evidence of some degree of purposing on the part of the child. The behavior is so organized as to reach some goal.

5. Change Effected Through Purposive Behavior. As the environment stimulates and acts upon the child and the child in turn reacts upon the environment through systems of purposive responses, the behavior of the child is modified, changed. The infant sees the flame of the candle, reaches for it, is burned. After a few experiences of this kind the observer notes a change in the behavior of the infant. It soon learns to refrain from touching the candle. The snow has fallen and John purposes to construct a bob-sled in order that he may play at coasting down hill with other boys and girls. But by the time the sled has been completed John's behavior with respect to the construction of bob-sleds has improved. He can make a better sled thereafter as a result of having had this experience. Life is a constant striving to react effectively to all conditions which affect it. But as human beings reach their objectives, in the form of skills attained, riches gained, unknowns explored, and social ends realized, they again launch out ever in search of goals more remote and more difficult of attainment. They lift themselves continually to higher levels of attainment and enjoyment through the responses that they make. They reach out for a goal and in the end attain it. But in the reaching they improve their ability to reach higher and farther. And this change is at the foundation of all education.

6. Summary. In this chapter an attempt has been made to bring out two fundamental ideas. First, all living things are dynamic and their strivings are purposive. This is brought about by the constant interaction of the forces of nature and the energies generated by living bodies. The environment acts as a system of stimuli upon the organism. The organism being a living thing in a stimulating environment reacts upon its surroundings. Second, through the responses that the organism makes to its environment its behavior is modified. And a series of successive changes in behavior results in the growth of the organism. What can be said of an organism in general can likewise be said of the child. And the changes that take place in the dynamic, purposive nature of children constitute the material with which any educational system must work.

CHAPTER II

EDUCATION THROUGH PURPOSIVE BEHAVIOR

1. Subject-Matter of the Teacher. The subject-matter of the teacher is the purposive behavior of boys and girls. It is thus for at least two reasons. In the first place boys and girls, in common with all things about us, are dynamic. They are by nature active. They seem to crave purposive expression of some kind at all times. It may be at one time exploring something, at another time constructing something, still at another time communicating something, or perhaps competing in something. Purposive behavior of some kind, in short, is the essence of child life. In the second place, growth of boys and girls, in common with all things about us, takes place in and through purposive behavior. It is through the child's behavior that changes in its conduct take place. For example, in the child's pursuit of Roly Poly many changes in its conduct ensue at the time. At the beginning of the game the child could, for example, throw balls through a large circle erected perpendicularly on the floor, make straight lines on the blackboard in the form of rectangles and circles of various forms and sizes, communicate scores in playing Circle Ball, record Circle Ball scores, etc. At the end of the game the child could throw balls at Roly Polys placed on a triangle drawn on the schoolroom floor, make a triangle on the schoolroom floor, communicate Roly Poly scores, record Roly Poly scores, etc. Many other changes in the child's behavior took place in this instance but these suffice to point out the fact that growth takes place in and through the purposive behavior of boys and girls.

The teacher is interested, for this reason, in what boys and girls are doing at any given time. Let us take an example to illustrate the point. John is gathering pieces of lumber, nails, and tools about his work bench in the manual training shop. He places the boards, one at a time, in the vise and with the saw cuts them into certain shapes and lengths. The pieces are then arranged in an orderly fashion and nailed together. He works intently at his task. He says nothing to the observer standing near by. No observable reaction is made to the humming and whirring of motors and other machinery that is in motion near at hand. An organized form of behavior is exhibited which seems to lead to some definite goal. By observing John's behavior for a time it is found that he is constructing a bob-sled to be used, presumably, for coasting on the snow which fell the night before. It is this and other forms of behavior of the individual that engage the interest of the teacher, for it is through such behavior boys and girls grow.

2. The Basis of Purposive Behavior. At this point, let us introduce two terms—stimulus (designated as S) and response (symbolized by R). Suppose you are sitting on the edge of a table with your feet hanging freely. With a small wooden hammer, constructed for the purpose, I strike the tendon just below your right knee. Immediately the right foot is thrust forward, the amplitude of the movement corresponding roughly to the intensity of the stroke. In this phenomenon, we have one of the simplest illustrations of the relation between stimulus and response. Other examples of this simple S-R relationship are the contractions of the pupil in the eye when the degree of luminosity of the room is increased; the grasping movements of the infant's fingers when a lead pencil is placed in its hand; the withdrawing of the hand when the finger is pricked with a sharp object; and starting when a loud noise is heard. Examples of the more complex relationship are seen when the chauffeur stops his automobile at the intersection on seeing that the automatic signal indicates that traffic is closed to him; when the voter goes to the polls and casts his ballot for certain individuals who are offering themselves as servants of the city or county in which he lives; and when the young man or woman makes preparation to enter college for the first time.

By stimulus we mean any object, situation, or condition which is prepotent over all others to elicit some form of action on the part of the individual. The stimulus may be applied through the avenue of some external organ of stimulation, such as the tongue, ear, nose, eye, and surface of the skin. Or, its application may be effected through the function of internal organs of stimulation, as, for example, the violent contractions of the walls of the stomach when it is empty, distention of the walls of the bladder, and the stretching of muscle fibers. By response we mean anything the individual does when he is stimulated. He may secrete saliva when an object is placed in the mouth, turn his head in the direction of the source of a sound, reach for an object which is seen or withdraw the hand when the finger has been burned. This stimulus-response relationship explains the basis of purposive behavior in any instance of life.

3. The Problem of Teaching. The teacher has as her main objective the growth of boys and girls. Since boys and girls grow through purposive behavior the teacher's problem is one of stimulating and directing the purposive behavior of boys and girls. Under what conditions of stimulation and direction can John be expected to undergo change in his behavior? It is desirable, for example, that he grow in communicative behavior. This form of behavior, beginning in infancy and continuing throughout life, is perhaps one of the most important types of behavior in which he will ever engage. First of all, he must grow in expressing himself through vocal behavior. In early life vocal communication is the means by which he makes known his needs. As he grows, the use and understanding of vocal communication becomes an agency of control and adjustment in the social group in which he lives. The problem of teaching in guiding John's growth along this line is twofold. First, what kind of stimulation is conducive to changes in John's communicative behavior? How to provide stimuli conducive to changes in behavior in this particular constitutes one very important phase of teaching. Second, what kind of direction is conducive to changes in John's communicative behavior? How to provide aid conducive to changes in behavior along this line constitutes a second very important phase of teaching. The problem of teaching, in short, demands a study of the purposive behavior of boys and girls for the purpose of discovering the kind of stimulation and direction conducive to changes in the behavior under way. The teacher, like the botanist, must know, on the one hand, the kind of stimuli conducive to changes in a particular type of behavior and, on the other hand, the kind of aid necessary in making it possible for such changes to take place at the time. The problem of teaching is providing these conditions, for the teacher, like the botanist, is interested in growth.

4. Present Needs of the Teacher. The child, like all things about us, is a reacting agent. It is active in some way along some line at all times and it is in and through this action that changes in its behavior take place. These changes in the child's behavior constitute learning, growth, education. The particular problem of the teacher is guidance of the behavior of boys and girls for it is in this way they grow. To consummate this end effectually the teacher must be a constant student of the behavior of boys and girls. She must, for example, be proficient along at least the following lines. First, the teacher must have a dynamic point of view. She must recognize the fact that boys and girls, in common with all things, are ever active. She must understand that behavior of some kind along some line is at bottom of all things whether it be the boys or the girls, the man or the woman, the tulip or the frog. Second, the teacher must recognize the fact that boys and girls, in common with all things, grow in and through their own behavior. She must understand that learning, growth, education take place at the time the activities of boys and girls are under way. Third, the teacher must recognize the fact that behavior of boys and girls, in common with the behavior of all things, depends upon stimulation and direction of some kind. She must understand how to provide the conditions—stimulation and direction—conducive to changes in the purposive behavior of boys and girls. This volume hopes, in a measure, to enable the teacher to improve along these lines. An effort is made particularly to give the teacher a better insight into the process of growing in boys and girls and how to guide the process in actual school situations, for these are the present needs of all teachers interested in the growth of boys and girls.

PART II

THE FOUNDATIONS OF PURPOSIVE BEHAVIOR

CHAPTER III

MECHANISMS OF PURPOSIVE BEHAVIOR: ORGANS OF STIMULATION

1. Organs of Purposive Behavior. In the second chapter was outlined a program of education based on the purposive activities of boys and girls. The present chapter and several of the following chapters will be devoted to a consideration of the physiological mechanisms underlying purposive behavior. Since the purpose of education is to stimulate and direct the child in its purposive behavior, it will be well to come to some understanding of the way in which the child reacts to its environment.

At this point let us reintroduce two terms, *stimulus* and *response*. By stimulus is meant any object, situation, or condition which is prepotent over all others in eliciting some form of action or in bringing about a change in the behavior in the child. The stimulus may be applied through either an external or an internal avenue. By response is meant anything the child does when it is stimulated. It may be made by either external or internal organs.

In order that a purposive response may be made to a stimulating situation, a purposive mechanism is necessary. The first set of organs involved in this purposive mechanism is the organs of stimulation. An organ of stimulation is a highly specialized area of protoplasm where foreign energies may impinge upon the body and can be transformed from inorganic or chemical forces into vital functions. Another set of organs involved in a purposive mechanism is the organs of response. An organ of response is a structure which brings about the change in the environment necessary to fulfill the needs of the child when it is stimulated. A third set of organs in a purposive mechanism is the organs of connection. These are composed of the neural fibers connecting the organs of stimulation with the organs of response. The first of these organs will be considered in this chapter and the other two will be discussed in the two chapters following.

2. **The Child Amidst Multiple Stimuli.** The child lives in a world of multiple stimulation. The world is teeming with energies of various kinds which are potential stimuli. From the time the child is born until the end of life it is subjected constantly to these conditions of stimulation. Even during sleep it does not entirely escape their influence. Stevenson [1] has expressed this idea in the following lines:

> "The world is so full of a number of things
> I'm sure we should all be as happy as kings."

It is impossible to begin to enumerate the various kinds of stimulation. But as examples there are the harmonious combinations of colors in the flowers, in the rainbow, or in the sunset; the refreshing coolness of the sea-breeze; the downy softness of the fur of the young rabbit; the fragrance of the honeysuckle; the murmuring of the mountain brook; the melodious combinations of tones from the violin; the delicious tastes combined in the culinary art; the strength, grace, and beauty in sculpture, architecture, and painting; and the invigorating effect to be experienced in dancing, skating, rowing, and bicycling. All of these conditions of stimulation and countless others are in store for the child when it is born into the world and continue to be effective throughout life.

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[1] Stevenson, R. L. A Child's Garden of Verses.

3. Readiness in Terms of Specialized Sensitivity of Protoplasm. All protoplasm is sensitive or irritable. According to Herrick,[2] "The immediate response of living substance to irritation we call excitation. This is an active protoplasmic function—clearly a very special kind of physico-chemical process. . . . All protoplasm is capable of transmitting such excitations through its own substance—some with speed and facility and some less rapidly—and thus activity radiates for longer or shorter distances from the point of excitation." Elsewhere Herrick [3] points out in effect that protoplasm in its simplest form is sensitive to some form of mechanical and chemical stimulation. In fact, all of the functions of nervous tissue are implicit in undifferentiated protoplasm. But the bodies of all except a few of the lowest organisms are covered and protected by some kind of shell or cuticle from excessive stimulation from the outside, and individual parts of the surface are then differentiated in such a way as to be sensitive to only one group of excitations while remaining insensitive to all other forms. Thus arise the organs of stimulation, each of which consists essentially of specialized protoplasm which in turn is highly sensitive to some particular form of energy manifestation, but relatively insensitive to other forms of stimulation. Each organ of stimulation, in addition, is composed of certain accessory parts, adapted to concentrate the stimuli upon the essential sensitive protoplasm, to intensify the force of the

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[2] Herrick, C. J. Neurological Foundations of Animal Behavior, p. 53, 1924. By permission of Henry Holt and Co.

[3] Herrick, C. J. Introduction to Neurology, p. 74, 1918.

stimulus, or to transform the energy of the stimulus so as to enable it to act more effectively upon the essential mechanism of stimulation.

As we ascend the zoological scale from the level of lower animals to that of man we find this function of irritability present. However, there is a wide variation in the degree of specialization of organs of stimulation. In the lower orders there is no differentiation of mechanism. But in the higher orders there is the most complex development of specialized structures making possible the finest degrees of specialization in irritability.

So in the light of the above statements, it is possible to conceive of the organs of stimulation as mechanisms which are in a state of readiness to be stimulated by special kinds of stimulation. Some mechanisms are in readiness to be stimulated by light waves of colors, others by sound waves from the violin, and still others by coming in contact with objects.

4. General Functions of the Organs of Stimulation in Purposive Behavior. In discussing the functions of the organs of stimulation, Herrick[4] has well expressed the idea to be brought out at this point. "Their function is to select from the infinite manifold of energy manifestations by which the body is surrounded those which have value for the body and to sort these selected forms and so distribute them to the different correlation centers that they may be recombined and discharged to the motor centers requisite to give appropriate reactions."

"If, as is generally agreed, the process of living is the adjustment of the inner activities of the organism to the

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[4] Herrick, C. J. Neurological Foundations of Animal Behavior, pp. 19, 43, 1924. By permission of Henry Holt and Co.

events taking place in that segment of the world which forms its natural habitat, evidently the receiving organs (sense organs) are critical points in this adjustment, for these are places where external energies impinge upon the body surface and are transformed from inorganic physical or chemical forces into vital functions. The sense organs are the highest points in the excitation-conduction gradients and they are centers of physiological dominance with reference to the apparatus of transmission and response which are immediately activated by them."

"There is nothing in our experiences, there are no mental powers, no skill in ratiocination or logical analysis, no capacity for forecasting the future events, no flights of imaginative fancy, which do not depend directly or indirectly upon sensory data. The mind of man is truly creative in the sense that new and hitherto unimagined ideas are fabricated for the element of experience can be recombined in new patterns. We surpass brutes in our capacity to use the data so provided and to supplement our limited and in some cases defective sense organs by artificial aids, such as spectacles and microscopes, but never can our thinking transcend the realm of sense experience. The most abstruse metaphysical speculation, in common with the highest flight of poetic fancy and the keenest esthetic appreciation, are earthbound within the limits set by our physical sensory equipment."

5. Specific Functions of the Organs of Stimulation in Purposive Behavior. It will be well at this point to consider very briefly the structural characteristics of the organs of stimulation, the kinds of stimulation to which they are especially sensitive, and the kinds of behavior made possible by their stimulation. A more complete and detailed

statement of their structure and function can be found in almost any good introductory textbook in psychology or physiology.

According to the functions performed by the organs of stimulation, they may be divided into the following kinds: auditory, visual, olfactory, gustatory, cutaneous, static, kinesthetic, and organic.

(1) *Auditory Organs of Stimulation.* The structures for hearing are located in the cochlea of the inner ear and are in the form of hair cells. These cells are so specialized that each responds to an air wave of certain frequency, and the result is the hearing of a certain tone or noise. The frequency of air waves determines the *pitch* of the tone heard. The amplitude or intensity of the wave determines the *intensity* or loudness of the tone. A vibrating string as in the violin or a vibrating air column as in the pipe organ vibrates as a whole and also in segments. The vibration of the string as a whole gives what is known as the fundamental tone of that string. The segmental vibrations give tones known as overtones. An instrument which gives off a large number of overtones is a good instrument for making music. All of these factors combine to determine what is called the *timbre* of the tone.

The ear is so constructed that it is possible for the child to analyze the sound wave coming from an orchestra of several pieces and determine the various instruments included. Although the waves coming from these various instruments which are vibrating simultaneously are fused into one wave the child hears them as a single complex wave. Timbre differences, pitch differences, and intensity differences are readily selected.

(2) *Visual Organs of Stimulation.* The specialized organ for visual stimulation is composed of the rod and cone cells of the retina and the various accessory structures of the eye. The rod and cone cells, which in turn are connected with the fibers of the visual tract, are sensitive to stimulation by restricted lengths of light waves. Shorter waves of light falling upon the retina produce violet. As the waves are increased in length other colors are produced in order, indigo, blue, green, yellow, orange, and red. All experiences of color and brightness are mediated through the stimulation of these organs.

(3) *Olfactory Organs of Stimulation.* The structures which have become specialized for olfactory stimulation consist of the epithelial cells in the upper part of the nose. These organs are stimulated by gaseous substances carried to the nose by air currents, which produce the characteristic odors of everyday life.

(4) *Gustatory Organs of Stimulation.* Organs of stimulation for taste are located in the outer regions of the upper surface of the tongue and in the throat. These organs can be stimulated by some soluble substance. The common taste experiences are sour, bitter, sweet, and salt. All other tastes are combinations of these primary taste qualities.

(5) *Cutaneous Organs of Stimulation.* There are four experiences which can be mediated by stimulation of organs in the skin. These are cold, warmth, pain, and contact or touch. Through the stimulation of these organs the child gets all of its experiences of pain, cold, warmth, roughness, smoothness, dampness, dryness, softness, solidness, and shape of object with which it comes in contact.

(6) *Static Organs of Stimulation.* In the semicircular canals of the inner ear are located the organs of stimulation

for the maintenance of balance or equilibrium. Movements of the head and body bring about a stimulation of these organs which make it possible for the child to keep its body in a state of equilibrium in walking, running, riding a bicycle, skating, dancing and in performing many of the activities in school work.

(7) *Kinesthetic Organs of Stimulation.* In the muscles, joints, and tendons are found sensitive structures which function in coordinating the movements of the body. They are stimulated by the stretching of muscles and tendons and the movements of joints. Learning to perform any kind of motor task as in writing, typing, playing the piano, using wood tools, and other similar activities, is dependent upon the functioning of these organs of stimulation.

(8) *Organic Organs of Stimulation.* In the tissues of various internal structures are found organs of stimulation for such experiences as internal pain, nausea, hunger, and thirst. The functioning of these organs has a profound influence on the purposive behavior of the child. Initiative, vigor, and vitality with which it enters into the various activities of the home and the school are dependent upon the effectiveness with which these organs and others with which they are associated do their work. They are closely connected with the emotional life of the child. Characteristics of temperament and the attitudes which are developed in child life are traceable to a large extent to the functioning of these internal organs of stimulation.

It may be said that the functioning of the organs of stimulation provides to a great extent the basis for the education of the child. As was stated in the previous section of this chapter all experiences are mediated through the stimulation of these organs. Without such structure there can be no experiences and no learning. The child learns to talk, to read, and to write, through such experiences as hearing other children talk, seeing the symbols on the printed page, and copying symbols in script. Seeing and handling flowers and animals in the laboratory; making things in the shop and sewing room; visiting the museum; observing what goes on in the industrial plant; looking at maps, paintings, and motion pictures; hearing the reproduction of a work of musical or dramatic art; as well as multitudes of other activities in which boys engage are made possible by the normal functioning of organs of stimulation and are at the foundation of all growth of boys and girls in purposive behavior.

6. Summary. Since a program of education can be worked out in terms of the purposive responses that boys and girls make to directed stimulation, some consideration should be given to the physiological mechanisms underlying purposive behavior. There are three parts of such a mechanism. First, there are the organs of stimulation. These organs are areas of protoplasm which are highly specialized for certain kinds of stimulation, as the cells in the eye, ear and nose; the structures in the tongue, skin, muscles, tendon, and joints; and the internal mechanisms. Second, there are the organs of response. A response organ is one which brings about a change in the environment of the child necessary to satisfy its needs when it is stimulated. Third, there are organs called connectors. It is their function to connect the organs of stimulation and the organs of response. This connection is mediated by means of neural fibers which make pathways of conduction between the two types of organs. The latter two of these organs will be considered in the following chapters.

The child is born into the world amidst a multitude of stimulations. In order that the child may discriminate with respect to the stimulating conditions among which it is placed, there must be specialized organs for each kind of stimulation. Each specialized mechanism is sensitive to, or is in a state of readiness to be stimulated by, a definite kind of stimulating energy.

The general function of the organs of stimulation is to select from the manifold of energy manifestations which surround the child those which have some value for its welfare and distribute them to reacting organs so as to make possible the appropriate responses.

CHAPTER IV

MECHANISMS OF PURPOSIVE BEHAVIOR: ORGANS OF RESPONSE

1. **Life Demands Specialized Responses.** It was pointed out in the preceding chapter that there are countless energies in the form of potential stimulations which are constantly affecting the behavior of the child throughout life. It is by means of the selective functioning of the organs of stimulation that the child can determine to which phase of its stimulating environment it is to react at any given time. But in order that behavior may be adequate to satisfy the demands made upon the child, the responses likewise must be selective and specialized. Mere random reactions of a response organ will generally be inadequate. Contractions of the general musculature of the body will not write a letter, play the piano, make a bookcase, cut out a dress pattern, or win a debate. Active secretion of the general glandular system will not result in the proper growth of the body, the digestion of food, or properly modify the constituency of the blood. In order that the child may respond effectively to special kinds of stimulation, it must be equipped with differentiated and specialized organs of response.

2. **Specialized Organs of Response.** As was indicated in the previous chapter an organ of response is an organ which brings about a change in the environment necessary to fulfill the needs of the child when it is stimulated. Organs

of stimulation would be valueless without corresponding organs of response. In order for behavior to be complete and effective, the stimulus organs must be in functional connection with response organs. An individual equipped with specialized organs of stimulation but without organs of response would be like a steam engine without machinery to turn, a radio broadcasting station without a receiving set to receive the message, or a general without an army to fight the battle.

The lower orders of life are greatly limited in the extent to which they can meet a trying situation because of the lack of specialized organs of response. First of all, there is the slow and laborious method of locomotion of some lower organisms. These organisms are inefficient in escaping from danger. They are easily captured when preyed upon by enemies. Likewise this lack of adequate organs of locomotion restricts the range of activities. Many such organisms live and die in the same limited environment. Second, they lack the motor ability to manipulate effectively objects in the immediate surroundings. Feeding responses can be made in only a certain way. On this account the range of food substances is limited.

But in ascending the scale of animal life it is found that these organs become more and more differentiated and their functions more specialized. The variety of responses which a child exhibits during the day is almost unlimited. Locomotion can be mediated in various ways and at varying speeds. Manipulation of elements of the physical environment is very extensive, making it possible for the child to communicate with other children, play a musical instrument, paint a landscape, read a good book, construct a toy, or play a game.

There are two classes of response organs, namely, muscles and glands. Since it is only the muscles that are under direct control and therefore of more importance in the educative process, the discussion will be limited to this group of response organs. It is quite clear that most of the responses the child makes in relation to its environment are made possible by muscles or combinations of muscles and bones. The bones are important in the reactions the child makes. In addition to the support they give the body, they provide the various combinations of muscle-bone levers. The number of muscles and bones in the body is limited, yet by means of the unlimited number of combinations that can be made of them a great variety of responses is possible.

3. **Readiness in Terms of Specialized Organs of Response.** In the previous chapter it was indicated that an organ of stimulation might be conceived as one which is in a state of readiness to be stimulated by a certain kind of stimulation. Likewise an organ of response is a mechanism which is in a state of readiness to react in a certain way when it is stimulated through the organ of stimulation with which it is connected. The hand, as a result of its organization of muscle, bone and tendon, is in a state of readiness to grasp a ball when the child sees or comes in contact with a ball. This movement can be greatly modified and combined with other reactions and makes possible other modes of behavior. The vocal organ is in a state of readiness to react and produce sounds when the child hears vocal sounds by other individuals or wishes to communicate with other individuals. Readiness in the sense used here is to be thought of only as a predisposition to react in a certain way due to the organization of the structure involved.

4. General Functions of the Organs of Response in Purposive Behavior. As has been stated previously, an organ of response is an organ especially developed to react in a certain way when it is stimulated. The importance of the general function of these organs cannot be overemphasized. In commenting upon this point, Carr [1] makes the following statements: "It is needless to observe that sensory and nervous development would be valueless without a corresponding motor ability. While the number of muscles in the human organism is relatively limited, yet by their varied combination, a great variety of movement is possible. It is usual to ascribe man's superior motor endowment to two factors. One is his vocal or laryngeal ability. Civilization is dependent upon language and intercommunication, and any highly developed language implies a considerable range of vocal capacity. True it is that vocal capacity alone will not insure the development of language, but this ability does constitute one of its essential conditions. Certain it is that man is superior to the animals in this respect with the possible exception of some species of birds. Another distinctive characteristic of man is his manipulative and constructive ability. The whole economic and industrial life of society is intimately dependent upon manual dexterity. Man builds houses, makes clothing, fashions tools, prepares food, etc. With a few exceptions like the dam-building of beavers and the nest-building activities of birds, animals manifest no constructive ability. Animals for the most part conform their actions to the world, while man transforms this world to suit his own purposes. Man's superior capacity is in part dependent upon the possession of a motor organ nicely adapted to this function. Man's erect posture permits the hands and arms to be devoted exclusively to manipulation. While some quadrupeds use their paws for this purpose, yet their manipulative ability is considerably restricted by their inability to maintain an erect posture and move freely on two legs. Man also possesses the power to oppose the thumb and fingers,—a capacity which renders the hand a most serviceable organ for manipulation. No animal possesses this power. It is doubtful if a society of primitive men devoid of arms and hands could ever have evolved beyond the state of savagery."

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[1] Carr, H. A. Psychology, pp. 65-66, 1925. By permission of Longmans, Green and Co.

5. **Specific Functions of the Organs of Response in Purposive Behavior.** The hand is one of the most important organs of response. As to its general importance, Dorsey[2] makes the following statements: ". . . To fly is to be free. Bats can fly. They are high mammals; they are marvelously free. But at what a price! They lost their *hands*. They cannot handle things. A baby can; does. That handling of things is a priceless possession, worth more than eagle's wings. With hands the baby brings things up to its eyes, ears, nose, mouth; turns things over, examines them from all sides; prods things to see if they are alive; shakes them to learn if they are hollow; feels them to find out if they are ripe or rotten or hard or smooth or hot; feels its own body, explores itself."

First of all, the hand can be used in communication. One of the earlier forms of language was gesture language. In our own civilization gestures are still used very extensively. Under conditions where the voice cannot be heard, it is necessary to rely entirely upon conventional signs when communication is desired. Deaf mutes depend largely upon the use of standardized signs made by the hands as a means of communication with others. Likewise, in public speaking, dramatization and other forms of the interpretation of literature the use of gestures is relied upon to convey the finer shades of meaning desired.

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[2] Dorsey, G. A. Why We Behave Like Human Beings, p. 4, 1925. By permission of Harper and Brothers.

In the second place, the hand is absolutely essential in the use of many tools and in acquiring any manual skill. The use of tools plays a very important rôle in the education of the child. Judd,[3] in commenting upon the relative educational value of direct responses such as the use of the limbs in the acts of locomotion on the one hand and indirect responses as in the use of tools on the other, makes the following statements: "Education trains the child to take a tool in his hand. The moment the child takes the tool he breaks away from the animal kingdom and becomes a human artisan. That moment his simple reactions sink into relative unimportance. He begins to use his higher nervous centers and to live a life of indirect forms of reaction."

The structure of the forearm and hand is such as to make a multitude of responses possible. First, the bones of the hand and wrist make it possible to turn the hand through almost a complete rotation. This type of movement is involved in turning a key in the lock; operating a screwdriver; varying the tension of violin string; or turning the knob of a door. As was indicated by Carr above, another interesting and valuable structural characteristic of the hand is the opposition of the thumb to the remaining manual digits. This arrangement makes limitless possibilities of grasping, plucking, and other delicate finger movements. These movements are observed in the use of the handsaw, wrench, hammer, tennis racquet, baseball bat; throwing a ball; plucking the strings of a harp; setting type, playing the piano; operating the typewriter, linotype, and calculator; and writing a letter with a pencil or pen.

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[3] Judd, C. H. "Language as a Higher Form of Reaction." Elem. Sch. J., 1925, 25, 335-345. By permission of the Elementary School Journal.

Another response organ of great importance from an educational standpoint is the vocal organ. The vocal cords, the resonating cavities along the respiratory tract, the tongue, the lips, the teeth, and the diaphragm with its system of muscles, provide the basic organ for the spoken word. This organ can be trained to speak any language. Out of the babblings of the infant can be built up the language of the Englishman, the German, the Irishman, the Frenchman, or the Chinaman.

It is interesting to note at this point why it is that in the human race the vocal cords have come to hold so prominent a position as organs of communication. As Judd [4] suggests these organs are important, first, because there is in the vocal cords an organ of the highest degree of flexibility. The movements of muscles which control these organs are far more delicate than those of the hand or other organs which might be used as organs of communication. The finest shades of meaning are expressed through the precise adjustment of these muscles. Their movements produce auditory stimulations which are valuable from the standpoint of the one to whom the message is to be communicated, because it is not necessary that the speaker be visible to the hearer. They are valuable also to the speaker, since they serve as a check against inaccuracy and ineffectiveness. In the second place, the vocal cords are supreme as organs of speech because they are practically independent of external conditions. For example, darkness, mists, or even walls do not produce complete barriers to vocal communication as would be the case with any organ requiring vision. Lastly, the vocal cords rather than the hands are selected as an organ of communication because they free the hands for other purposes which the cords could not fulfill. As was indicated above the hands become useful in the development of technical skills. The arts are learned and engaged in with the hands. And, as Judd points out the hands cannot be spared for social communication. In fact, it frequently happens that the most important function of social communication is to aid members of society to cooperate with their hands, as in moving heavy objects. The hands as technical instruments are too valuable to be used for communication, but the vocal organ is positively useless as a technical instrument.

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[4] Judd, C. H. Psychology of High School Subjects, p. 144, 1915.

The foot, as an organ of response, is more difficult to describe because its functions are less definite than those of the hand or the speech organ. It is very important, nevertheless, and deserves consideration here. In the first place, the foot, with the system of bones and muscles attached to it is essential in locomotion. Much of the civilization of man is dependent upon his ability to move from place to place with agility. Second, there are many instruments and devices which have been especially designed for the use of the foot. The operation of the gears of an automobile require coordinated foot movements. Many pieces of machinery in the factory and in the shop have been particularly designed for the use of the foot. Third, the most important function of the foot is to aid in maintaining an upright posture of the body while standing or moving from place to place. This frees the hands for a multitude of activities and makes possible intelligent forms of behavior which cannot be approached by animals whose forelimbs are restricted to responses necessary for locomotion. The human foot would be even more valuable if it were not necessary to enclose it in a shoe which prevents practically all movements of the articulated parts. Individuals who have been armless from birth or who have acquired this condition as a result of accident, can learn to write, play certain musical instruments, and make many other delicate and refined responses with their feet.

The whole skeleton of bones and the systems of muscles attached to them might be conceived as a gross organ of response. All bodily postures, all coordination between movements of various members of the body, are made possible by these systems of bones and muscles. These organs of response composed of bones and muscles are difficult to isolate and describe, but they are highly important in the functions which they perform and in the extent to which their responses can be improved through training.

The organs of response considered here do not represent a complete inventory of such organs. But they are representative. What has been said of them will in a measure be true of others. Some understanding of them will be of particular value to the teacher and the child because they provide the fundamental responses upon which the education of the child must be built.

6. Summary. The child lives in an environment which provides a multitude of stimulations. Certain organs of stimulation have become specialized in relation to these stimulating energies. It is through these organs that the child determines to which phase of its environment it is to react. However, in order that behavior may be adequate to satisfy

the child's needs, the responses must likewise be specialized. This calls for specialized organs of response. These organs are more difficult to isolate and describe than the organs of stimulation, nevertheless, they have quite definite functions to perform. Organs of response are of two kinds, muscles and glands. Since the muscles are more directly under control, they are more important in the process of education.

An organ of response is one which, due to its structure and organization, is ready to react in a certain way when stimulated. The hand and the vocal organs constitute two of the most important organs of response. The education of the child as well as the development of civilization is dependent to a large degree upon the functioning of these two mechanisms. Other organs which are important are the foot and the skeletal musculature of the body.

The hand plays a large part in the education of the child. First of all, it is used in communication of one child with another, such as in the sign language of deaf mutes and in the use of gestures in the interpretation of dramatic literature and in public speaking. Second, it is absolutely essential in the use of tools. This indirect form of reaction to situations in the environment of the child opens up possibilities of modification of behavior which could not be approached without the use of hands. Lastly, the articulation of the fingers of the hand and arrangement of muscles and bones of the arm make it possible to manipulate machinery and other instruments the use of which have a very direct bearing upon the welfare of mankind.

CHAPTER V

MECHANISMS OF PURPOSIVE BEHAVIOR: ORGANS OF CONNECTION

1. **Relation of Organs of Stimulation to Organs of Response.** In previous chapters the importance of the rôles played by the organs of stimulation and of response was pointed out. But these organs would be useless in mediating intelligent behavior, if they were not interconnected. This interconnection is made possible by the interpolation of the nervous system between these two sets of organs. If it were possible to conceive of an individual normally supplied with stimulus organs and response organs but with out a nervous system, his efficiency in responding to stimulation would be comparable to the efficiency of a telephone system in which the lines had been severed, or that of an army whose lines of communication with its commanding officer had been broken. For every adequate stimulus applied to an organ of stimulation there is a reaction on the part of some organ of response. Conversely, every response presupposes an adequate stimulus of some kind. But this dependence of the one process upon the other could not exist without the mediating function of organs of connection.

2. **Specialized Organs of Connection.** It was also pointed out in the previous chapters that organs of stimulation have become especially adapted to certain kinds of

stimulation. Organs of response have become especially adapted to the performance of specific kinds of reactions. Likewise, the nervous system is a set of organs which have become especially adapted to the process of functionally connecting these stimulus organs and response organs by means of conducting nervous impulses from the former to the latter. It is the specific function of the organs of stimulation to receive stimulation and the specific function of the organs of response to react to the stimulus in terms of the prevailing needs. It is the specific function of the nervous system to connect these two sets of organs in such a manner as to make the reaction possible.

3. **Readiness in Terms of Specialized Organs of Connection.** An organ of connection is one which is in a state of readiness to conduct an impulse from an organ of stimulation to an organ of response. When John sees an apple, there is a set of neural connections which is in a state of readiness to conduct the impulse aroused by the stimulation of the eye to the muscles and bones of the arm and hand. As a result of the conduction of this impulse, John can reach for the apple and take hold of it. Likewise, when he hears his name called, there is a neural connection which is in a state of readiness to conduct the impulse from the ear to muscle organs involved in turning the head in the direction of the source of the sound. Likewise, other connection organs are in a state of readiness to conduct the nervous impulse from organs of stimulation to organs of response when the proper stimuli are presented.

4. **Kinds of Connectors.** There are two systems of connection organs, particularly from the standpoint of their functions. First, there is the *autonomic nervous system.* Connections made by this system control such reactions as

the secretion of glands, digestion of food, circulation of the blood, regulation of the bodily temperature, dilation and contraction of the pupil of the eye, accommodation of the lens of the eye for distance in vision, and respiration. Second, there is the *central nervous system.* This system of connections controls the use of the bones and general musculature of the body. All movements of the hands, arms, feet, legs, head, trunk, and the contraction of vocal muscles are mediated by connections of this system. The functions mediated by the central nervous system are to a high degree subject to educational control. But those of the autonomic system are generally not subject to extensive control in the school. Therefore, we may justly limit ourselves here to the discussion of the central nervous system.

5. **Divisions of the Central Nervous System.** The organs of connection called the central nervous system may be divided for convenience of discussion into three parts. In reality the nervous system functions more or less as a unit rather than in isolated parts. In Chapter VII a full discussion will be given of the unitary or integrated function of the whole body of the child, including all of the stimulus response mechanisms. But for convenience of the present discussion we may divide the nervous system into three divisions, namely, the spinal cord, the midbrain, and the cerebrum. The spinal cord is composed of a bundle of neural fibers running the full length of the column. Leading off from the spinal cord is a large number of spinal nerves which connect the legs, arms, hands, feet, with other parts of the body. The midbrain includes the medulla oblongata, cerebellum, and other masses of connecting nervous tissue. Leading off from this region of the nervous system is a group of fibers called the cranial nerves. These fibers connect the

various organs of stimulation located in the head with other parts of the body. Such organs connected by means of these fibers are the tongue, eye, and ear. The cerebrum occupies the cranial cavity of the head and is composed of two large symmetrical masses of nervous tissue, one on either side, which are known as cerebral hemispheres.

6. **The Neurone.** The neurone is the structural and functional unit of the nervous system. Since it plays such an important part in the behavior of the child, it will be well to consider briefly its structure and function.

Structurally, the neurone has several characteristics which are of interest to the educator. First, it is elongated, which makes possible the connection of an organ of stimulation with some organ of response at a remote point in the body. Second, the neurone usually has several collateral branches. These collaterals augment the number of organs of response which can be connected with a single organ of stimulation or vice versa. This is a very important factor in that it provides the basis for a multitude of responses to be made to a single situation. As will be shown in the third division of the book, this multiplicity or plurality of response is highly essential in the growth of behavior of boys and girls. Third, the terminals of the neurone are highly arborized. This condition provides further possibilities of varied connections between organs of response and organs of stimulation. The structural features of a neurone are shown in Figure 1.

Functionally, the neurone has especially important characteristics. First, it is irritable or sensitive to stimulation, as was shown in Chapter III to be the case of all living protoplasm. In other words, the neurone can be aroused by events reacting upon its receiving end giving rise to an impulse of physiological energy. Second, the neurone exhibits the function known as conductivity. The impulse of energy which is liberated at the receiving end is transmitted or propagated along its length to the discharging end. Third, the neurone is alleged to be modifiable especially at the point where one neurone comes in contact with another neurone, or the synapse. If this is true it is the most important function of the nervous system from the standpoint of the psychologist, because it is here that conditioning, training, or education may take place. Fourth, the neurone exhibits a refractory period during which it cannot be completely re-excited. This period of nonexcitability is independent of any condition of fatigue, since it is present in fresh nervous tissue. The refractory phase has an important bearing upon the dynamics of behavior which will be considered in Chapter VI in connection with the discussion of drive in terms of physiological readiness.

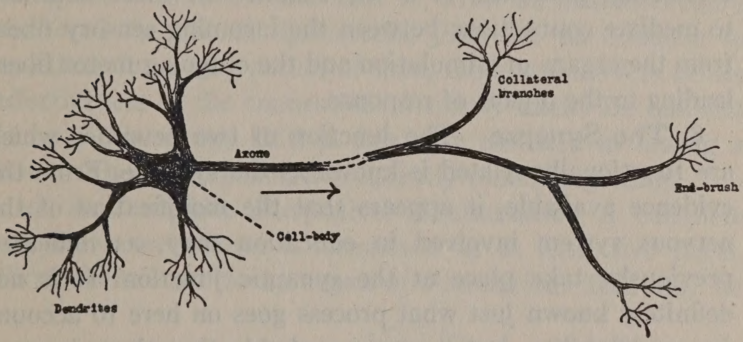

Figure 1.—A Neurone with its many appendages. (The arrow indicates the direction of the propagation of the nervous impulse.)

7. **Kinds of Neurones.** There are three kinds of neurones. First, there are the neurones which are called sensory

neurones. A sensory neurone is one which is in functional connection with an organ of stimulation and carries the impulse toward some central connecting system where it connects with other neurones. Second, there are the neurones which are called motor neurones. A motor neurone is one which is in functional connection with an organ of response. Third, there are the neurones which are called central or connecting neurones. It is the function of these neurones to mediate connections between the incoming sensory fibers from the organs of stimulation and the outgoing motor fibers leading to the organs of response.

8. The Synapse. The junction of two neurones which are functionally related is known as the synapse. From the evidence available, it appears that the modification of the nervous system involved in education may, as indicated previously, take place at the synaptic junction. It is not definitely known just what process goes on here to account for modifiability, but it seems probable that there is present in a given neural pathway before learning takes place some form of barrier to the conduction of the nervous impulse. In this connection, Herrick[1] makes the following statement: "This barrier is regarded by most physiologists as a semipermeable membrane, through which the ions dissociated during the excitation-conduction process, or some other substances can pass in one direction and not in the reverse direction. . . . It may, therefore, be regarded as established that at the synapse there is a contact of two dissimilar protoplasms, with resulting profound modification of the conduction at the apposed surface."

There are other theories as to the basis of this modifiability. Possibly some temporal factor in neural conduction is involved. In this connection the reader is referred to a footnote on page 143. This modifiability is the foundation of conditioning or learning. When John has learned to use correctly the hammer or the saw, a change has taken place in the junction of neural pathways connecting the organs of stimulation and the organs of response involved in using the hammer or the saw. If, after he has thoroughly mastered the use of these tools, John has no occasion to use them for a long period of time, there is some loss in the effectiveness of the connections formerly made. He has lost some of his former skill in driving a nail and in sawing a board. The phenomenon is frequently called forgetting.

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[1] Herrick, C. J. Neurological Foundations of Animal Behavior, p. 115, 1924. By permission of Henry Holt and Co.

9. A Complete Purposive Mechanism. A complete purposive mechanism is composed of at least five parts. First, there must be an organ of stimulation. This may be in the form of a specialized structure like the eye or it may be the free endings of nerve fibers as in the case of the organs for pain stimulation. The organ of stimulation is especially sensitive to certain kinds of stimulation, as light waves, sound waves, soluble substances, volatile substances, etc. Second, there must be a sensory nerve which conducts

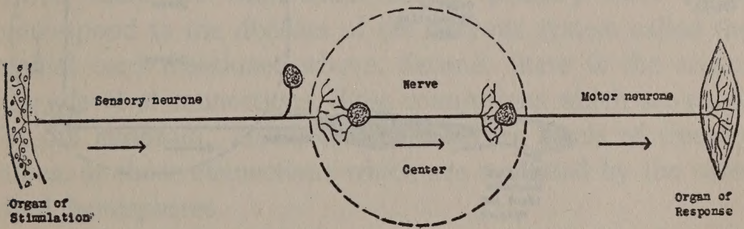

FIGURE 2.—A Schematic Representation of a Complete Stimulus-Response Mechanism. (The arrows indicate the direction taken by the nervous impulse.)

the impulse from the organ of stimulation. Third, there must be a nerve center which is composed of synaptic junctions and connecting neurones. Fourth, there must be a motor neurone which conducts the impulse from the nerve-center. Fifth, there must be an organ of response. This organ may be either a muscle or a gland. These five constituents are present in every purposive mechanism. There can be no response in the true sense of the word if any one of them is absent. A complete purposive mechanism is shown schematically in Figure 2.

10. An Illustration of a Complete Purposive Mechanism. We may illustrate in a simple way the function of the above-described mechanism. Suppose we take the mechanism involved in grasping a ball. First there is the organ of stimulation in the form of specialized structures in the eye which are stimulated when the child sees the ball. Then there is the sensory neurone which conducts the impulse along from the eye. Next is the nerve center where the sensory neurone joins the connecting neurone. Then follows the motor neurone which conducts the impulse from the

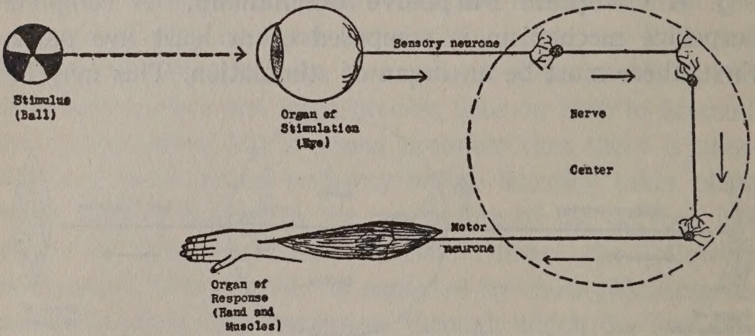
Stimulus (Ball)
Organ of Stimulation (Eye)
Sensory neurone
Nerve
Center
Motor neurone
Organ of Response (Hand and Muscles)

Figure 3.—A Schematic Representation of the Grasping Mechanism. (The arrows indicate the direction taken by the nervous impulse.)

connecting neurone. Lastly comes the organ of response, which in this case is composed of the muscles involved in moving the hand, flexing the fingers, etc. When the child sees the ball the muscles involved contract and the ball is grasped within the fingers. This mechanism is diagrammatically illustrated in Figure 3.

11. **Levels of Connection.** In discussing the structure of the neurone, it was pointed out that the branched collaterals and the arborized terminals greatly increase the possibilities of synaptic junctions in the nervous system. Another structural device which provides multitudes of potential connections is the superimposed relation of nerve centers. A nerve center is a common meeting place for a multitude of incoming and outgoing nerve fibers. Nerve centers are arranged roughly, according to the main divisions of the nervous system outlined above, in three levels. First, there are connections of the primary level which correspond to the division of the nervous system called the spinal cord mentioned above. Second, there is the secondary level of connections, those connections which are made in the midbrain. Third, there are higher levels of connections, or those connections which are mediated by the cerebral hemispheres.

12. **Illustrations of Connections at Different Levels.** Responses mediated by connections of the first level are of the simple reflex or unlearned type. There are various kinds of responses of this type which the child makes. All kinds of avoiding reactions or protective reactions are observed when painful, tickling, hot, or cold stimulations are applied to the hands, feet, or other surfaces of the body. The grasping reflex is another example. Other illustrations are the secretion of saliva when food is placed in the mouth, wink-

ing of the eye when an object comes near it, contraction of the pupil when a bright light is seen, swallowing when food is placed in the back of the mouth, sneezing when the nasal membrane is irritated, etc. A schematic representation of connections at this level is shown in Figure 4.

Responses made possible by connections of the second level are likewise of the reflex type but they are more complex than those of the first level. They involve a wider spread of muscular reaction and a higher degree of coordination of different muscular systems. The grasping response may be accompanied by movement of the limbs, readjustment of equilibration, and turning the head. Attempt to hold the hand of an infant and the result will be reactions at both the first and the second levels. It will first attempt to withdraw the hand. If this is unsuccessful, it will start waving the opposite hand, squirm and twist the body, and perhaps attempt to turn the body over. The coordinated movements are the results of connections of the second level. All behavior of boys and girls in school, in the home, or on the playground which calls for this high degree of coordination is mediated by connections at this level. Such responses as writing at the typewriter, playing the piano, painting a

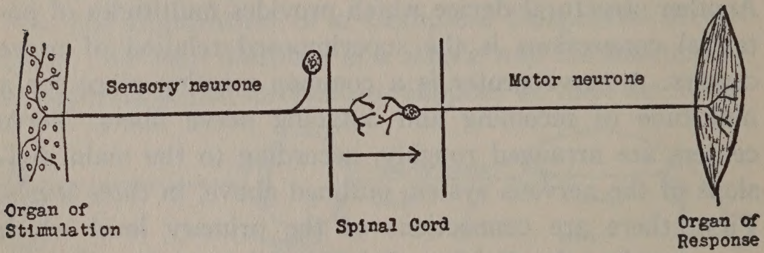

FIGURE 4.—A Schematic Representation of Neural Connections at the First or Spinal Cord Level. (The arrow indicates the direction taken by the nervous impulse.)

flower vase, or playing tennis, in so far as they require coordination of behavior are made possible by connections at the secondary or midbrain level. These connections are represented schematically in Figure 5.

Due to the fact that neurones are connected in a serial or chain arrangement, it is possible for an impulse arising from any organ of stimulation finally to reach the cerebral hemispheres or the higher centers of neural connections. If the finger has been pricked with a sharp instrument, withdrawing of the hand would be an instance of behavior resulting from connections of the first level. If, for some reason, the hand cannot be withdrawn easily and the body as a whole has to be moved, then the reactions are made possible by connections at the secondary level. But, suppose the result of the accident is the injury of the hand. Then there is in evidence some attempt to remedy the in-

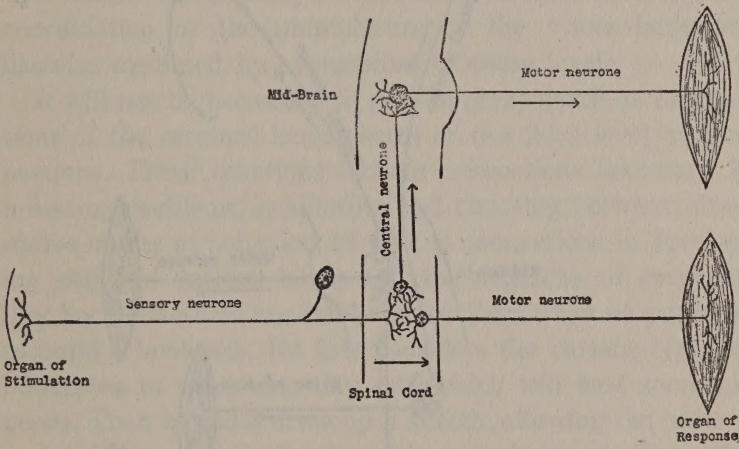
Motor neurone
Mid-Brain
Central neurone
Sensory neurone
Motor neurone
Organ of Stimulation
Spinal Cord
Organ of Response

FIGURE 5.—A Schematic Representation of Neural Connections at the Second or Mid-brain Level. (The arrows indicate the directions taken by the nervous impulse.)

jured member. A friend may be called to administer first aid, the doctor may be called to treat the wound, or the injured one may go to the hospital for the attention of a surgeon. In any of the latter cases, the behavior of the individual is made possible by connections mediated at the higher or cerebral level which is represented schematically in Figure 6.

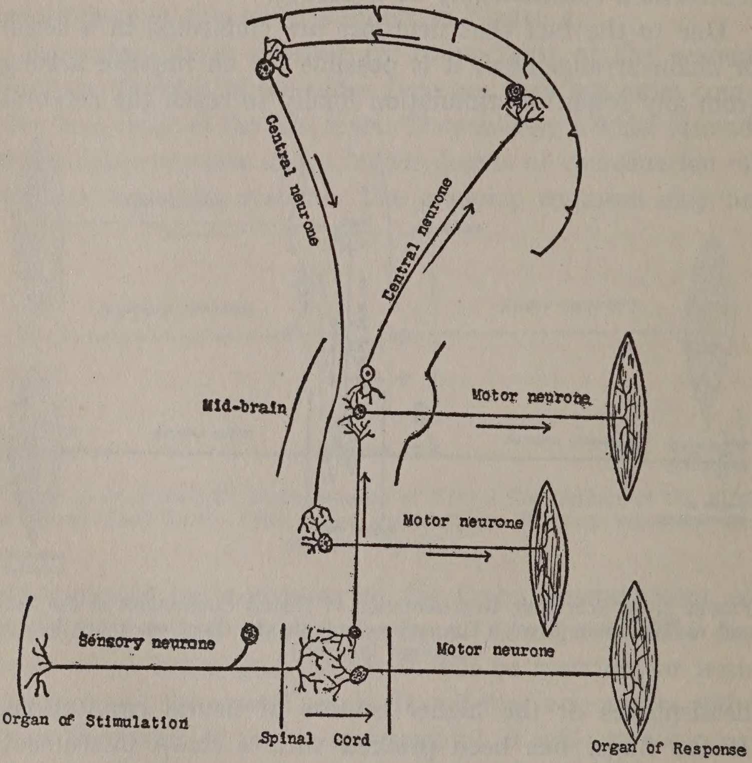
Central neurone
Central neurone
Mid-brain
Motor neurone
Motor neurone
Sensory neurone
Motor neurone
Organ of Stimulation
Spinal Cord
Organ of Response

FIGURE 6.—A Schematic Representation of Neural Connections at the Third or Cerebral Level. (The arrows indicate the directions taken by the nervous impulse.)

13. General Functions of the Levels of Connection. In the first and second levels of nerve centers are mediated all connections involved in the basic types of responses. These include, as was stated above, protective and avoiding reflexes, manipulative reflexes, and many other reflex responses. They also include the reactions involved in the maintenance of an upright posture and a state of general equilibrium of the body. Reactions necessary in a general coordination of the musculature of the whole body are likewise mediated by connections of these levels.

It will not be necessary to go into great detail as to functions of the cerebral hemispheres or the third level of connections. These functions include connections necessary in initiating problems, evaluating and choosing between alternative modes of behavior, as well as connections in developing skills of various kinds and the attitudes of everyday life. Such functions are exhibited by John when he purposes to build a bookcase. He first considers the various types of bookcases to determine that one which will best serve his needs. Then he must draw up a sketch, showing the pattern to be followed and the dimensions to be used. Then the materials must be selected from the standpoint of the kind of dressing and finishing to be used and the durability of the finished product. After this has been done, there comes the execution of the plans. Care and precision must characterize the construction of the bookcase, if the final outcome is to be worthy of the time, care, and materials used in its construction. Finally, there comes the evaluation of the outcome of his labors. Wherein has the execution of his plans been successful and at what points was it a failure? If another bookcase were to be constructed, what improvements could be introduced? All such forms of behavior as herein described are made possible by connections made in the brain, or the third level.

The functions of neural connections at higher levels are illustrated in forms of behavior other than in those listed above. Carr[2] has indicated several types of problems the solution of which would illustrate the type of neural function in question here. First, there are those problems in which there is a temporal conflict, that is a conflict between immediate and remote goals. Should John spend the money he earned last summer in taking a vacation trip or should he deposit it in the bank to be used in partly paying his way through college? Should he go to the movies or remain at home and study his lessons for the next day in school? Second, there are conflicts between individual or selfish goals on the one hand and the unselfish or social goals on the other. Should John cooperate with the teacher and pupils and abide by the regulations of the school, or should he stand out on his individual rights and do as he pleases? Should he lend a helping hand in solving problems which are of interest to the group, or should he insist on being individualistic and doing only those tasks which he chooses to do? Third, there are the conflicts between the baser and more idealistic goals. Should John cheat on the examination and thereby raise his score and in turn be nominated for membership in the honor society because of high scholarship, or should he take the examination fairly even though his score may be lower than he would like for it to be? Fourth, come the conflicts between future alternatives. Should John choose a professional or a business career? If he chooses one of the professions, which profession shall it be, law or medicine, teaching or the ministry?

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[2] Carr, H. A. Psychology, p. 200f., 1925.

All of these forms of behavior are made possible by connections formed in the cerebrum. An organism without this higher neural structure would never come in contact with such profound problems. Therefore, such refined forms of behavior as would be exhibited by John when confronted with such situations as the above could never be made by such an organism.

14. **Summary.** The organs of stimulation and of response would be functionless without some connecting organ between them. The nervous system supplies this connection. It is an organ which is in a state of readiness to conduct the nervous impulse aroused in an organ of stimulation to the appropriate organ of response. There are two kinds of connectors, the autonomic nervous system and the central nervous system. Since the central nervous system is mainly concerned in the educational process, the discussion is limited to this group of connectors. The central nervous system is divided into three main divisions, the spinal cord and spinal nerves, the midbrain and cranial nerves, and the cerebrum. Connections mediated by the spinal cord are of the simpler reflex type as in the case of grasping. The connections of the midbrain make possible a more complex type of reflex behavior as is involved in maintaining an upright posture, keeping the body in a state of equilibrium, and mediating coordinated reactions of the general musculature of the body. The connections of the cerebral level mediate behavior of the problem solving and learning type.

The neurone is the structural and the functional unit of the nervous system. It has certain structural characteristics which increase its functions as a connector. They are elongation, collateral branching, and arborized or branched terminals. Functionally, the neurone also has certain characteristics which make it valuable as a connector. They are irritability or sensitivity to stimulation, conductivity, modifiability, possibly at the junction with another neurone (synapse); and the exhibition of a refractory phase. There are three kinds of neurones, sensory, motor and central or connecting.

A complete purposive mechanism is composed of five parts. They are the organ of stimulation, the sensory nerve, the nerve center, the motor nerve, and the organ of response. This mechanism may be considered the physiological unit of purposive behavior. In order that a response may be made to a stimulus, these organs provide the minimum physiological equipment for the process.

CHAPTER VI

MECHANISMS OF PURPOSIVE BEHAVIOR: THE DYNAMICS OF BEHAVIOR

1. The Rôle of Drive in Behavior. In the study of behavior there are two general questions which confront us. First, "How does the individual perform the task before him?" Second, "Why does he do it?" In the previous chapters we have attempted to answer the first of these questions. In these chapters we have considered rather briefly the stimulus-response organs which are involved in various forms of behavior. The importance of these organs is fully recognized. But there is another factor in the physiological make-up of the child which is frequently overlooked, both in the theoretical and in the practical treatment of child-behavior problems. This factor is the dynamic nature of the child, the answer to the second question, "Why does the child do this thing rather than that thing, or why does he do this thing at all?" This dynamic thing in the behavior and the physiological make-up of the child should hold a very prominent place in the stimulation and direction of child growth in behavior. So the present chapter will be concerned with the rôle of the dynamics of behavior.

In considering the importance of this question Thurstone[1] gives us an interesting statement: "In the last analysis the datum for psychology is the dynamic living self and the energy groups into which it may be divided. We may refer to this datum as the Will to Live, or we may call it the Life-impulse, or the Vitality of the organism, or we may discover it to be the energy released by metabolism. We may be able to subdivide our will to live into large energy-groups which manifest themselves in conduct more or less independently. These energy groups would be our innate, dynamic, and more or less distinct sources of conduct, and we might come to call them drives, motives, instincts, determining tendencies, or any other word that represents that which we as individuals innately are, that which characterizes us as persons with individually preferred forms of life. . . . The living self consists of impulses to action, and the conflicts of these impulses. The conscious self I have thought of as made of impulses that are for some reason arrested while partly formed, incomplete impulses that are in the process of becoming conduct." And he sums up his idea in the following sentence: "Stated in a nutshell, my message is that psychology starts with the unrest of the inner self, and it completes its discovery in the contentment of the inner self."

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[1] Thurstone, L. L. The Nature of Intelligence, pp. xvi, 11f., 1924. By permission of Harcourt, Brace and Co.

2. **Drive Defined.** Broadly speaking we may divide a purposive mechanism into two parts, namely, the drive and the response. The distinction will be made more clear if we consider an illustration given by Woodworth [2] in the case of a machine. Here the response may consist of the work done by the systems of levers, pulleys, screws, inclined planes, and other forms of mechanical advantage which are necessary to secure the desired results. The drive is the power that makes the machine go. It may be in the form of

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[2] Woodworth, R. S. Dynamic Psychology, pp. 36-43, 1918. By permission of the Columbia University Press.

steam, gas, electricity, water-power, horse-power, man-power, or in other forms which are used in industry. When the drive or power is applied to the machine, it is made to go; the machine itself is relatively passive. "Its passivity is, to be sure, only relative, since the material and structure of the mechanism determine the direction that shall be taken by the power applied. We might speak of the mechanism as reacting to the power applied and so producing the results. But the mechanism without the power is inactive, dead, lacking in disposable energy."

Woodworth further points out that there is a relationship existing between two physiological mechanisms such, that one, being partially excited, becomes the drive for another. This is the basis of *preparatory* and *consummatory* reactions. "A consummatory reaction is one of direct value to the animal—one directly bringing satisfaction—such as eating or escaping from danger. . . . The preparatory reactions are mediately of benefit to the organism, their value lying in the fact that they lead to, and make possible, a consummatory reaction." So the relationship between the mechanism of behavior and the drive of behavior may be stated thus: "The drive is a mechanism already aroused and thus in a position to furnish stimulation to other mechanisms. Any mechanism might be a drive. But it is the mechanisms directed toward consummatory reactions—whether the simpler sort seen in animals or of the more complex sort exemplified by human desires and motives—that are most likely to act as drives. Some mechanisms act at once and relapse into quiet, while others can only bring their action to completion by first arousing other mechanisms."

Other writers have defined the dynamic force underlying behavior in somewhat different terms, but all of these expressions mean very much the same as that given by Woodworth. Moss[3] gives us the following characterization of drive. "By 'drive' I mean the impelling forces in the situation that stimulate the animal toward certain positive behavior. For example, if an animal is kept without food for a certain length of time, certain organic stimulations of the nerve-endings of the stomach provoke in the animal restless and seeking behavior until food is found and the 'drive' for the time being is stopped. It is to the motive force behind this seeking behavior that I apply the term 'drive.' "

Perrin[4] uses the term motive instead of drive and indicates that it admits of at least two definitions. "In the first place it refers to an 'inner' psychological process or function, a driving force to be found chiefly within the organism itself. And in the second place, the term suggests a plan, purpose, or ideal, with definite implication of an ideational element. This second conception, of course, includes the first, but even more than the first it belongs to human psychology."

Tolman[5] makes the following statements concerning the nature of drive: "The appetite (or *drive* in the sense used here) is evoked directly by a specific type of inherent physiological disturbance. This disturbance, when active, drives the organism to 'seek' (more or less successfully) a given type of external end-object or situation (example: food, sex-object, rest-object). The driving condition is initiated, internally, as the result of a metabolic rhythm. When this rhythm has reached the proper point in its cycle, the organism becomes restless and embarks upon exploratory movements, until finally it comes by chance (or by direct intent) into the presence of an appropriate type of external end-object (or situation). It then releases a 'consummatory' response (innate or acquired), e.g., eating, sex-activity, muscular relaxation, etc. Such is the normal sequence. . . . The ultimate drive is for the removal of the driving physiological conditions (or the prevention of the physiological injury or interference). It is these physiological needs which in the last analysis are sought and avoided."

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[3] Moss, F. A. "A Study of Animal Drives," J. of Exper. Psychol., 1924, 7, 165. By permission of the Psychological Review Co.

[4] Perrin, F. A. C. "The Psychology of Motivation." Psy. Rev., 1923, 30, 176-177. By permission of the Psychological Review Co.

[5] Tolman, E. C. "Nature of the Fundamental Drives." J. of Abn. Psy., and Soc. Psychol., 1925, 20, 350f. By permission of the author and editor.

In summary it may be said that the drive is that inner urge or impelling force resulting from some internal or physiological condition of the child which causes it to respond along a definite line of behavior. It is that force which causes the child to "face" the stimulus, so to speak, until the final goal is reached. This inner urge may even cause the child to go out on a hunt for a stimulus which will give the desired result. It will cause the child to vary his mode of responding and keep persisting in a given line of response until the consummatory response is made and the internal condition is removed or the inner urge is satisfied.

Thus it is seen that as students of child behavior we should strictly limit ourselves neither to the stimulus nor the response, but that we should consider carefully the dynamic or driving force behind all responses. We are interested in the kind of stimulations to which the child responds. Likewise, we are interested in how the reactions are made. But we are vitally interested in why the child makes this response rather than that response. It is highly important that we come to some understanding of the dynamics fundamental to child behavior in order that we may properly stimulate and direct the behavior of boys and girls in the choice and successful accomplishment of desirable goals in everyday life.

3. **Theories of the Nature of Drive.** Now that we have attempted to state what is meant by the term drive and have pointed out its place in stimulating and directing the behavior of boys and girls, it will be well to study its nature. Unfortunately, the experimental work done on the nature of the dynamics of behavior is very limited. However, a few studies which are quite significant have been made on the subject. Consideration of them will be given in this and succeeding chapters. A few theoretical studies will now be considered in some detail.

(1) Herrick's Theory of Reserves of Vital Energy. We may assume that one fundamental basis of drive is a reservoir of vital energy. Herrick [6] has given a very excellent account of this concept which it will be well to consider here. Vital processes generally involve the storing up of material and energy, the expenditure of which may result in improvement of the efficiency of behavior. When a reaction is made, it is not merely the transfer of energy which is applied at the organ of stimulation and released at the organ of response with which the organ of stimulation is connected. But a living body is constantly storing up a reservoir or potential energy and a very slight stimulus may result in drawing off energy from this reservoir that will be followed by an expenditure of energy entirely out of proportion to the intensity of the stimulus. Even in the case of simple reflexes there is an expenditure of accumulated reserves whose sources are connected in reflex arcs. If the stimulus is adequate a reaction is set going which seems to have an

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[6] Herrick, C. J. Brains of Rats and Men, p. 312ff., 1926. By permission of The University of Chicago Press.

impulsive drive and results in some kind of adaptation to the stimulating condition. If the situation is so unusual as to require something more than a simple reflex reaction, then other sources of energy are tapped in succession until a successful response is made or the organism is exhausted.

Herrick further points out that we not only find this reserve of vital energy in lower levels of nervous connections but that there is an abundant provision of neurological reserves available for any cortical activity. "In times of stress a man will outlast a horse, and an educated man may outwork an uncultured man of much more powerful physique because the cortical reserves are available to drive jaded muscles on to intense effort long after fatigue has exhausted the normal capacities of the subcortical apparatus. A part of this superiority lies in the intelligent conservation of effort in the earlier stages of a long program of severe labor and other expressions of the reserves of associational patterns. . . . But a part of this superior efficiency apparently results from direct activation by the cortex, which acts like a spur to an exhausted horse."

Indirect evidence is available to indicate that the primary innate modes of behavior are physiologically less exhausting than are activities involving recombination in unaccustomed patterns of these simpler modes of behavior. Herrick, however, desires that it be kept in mind that none of these processes which are motivated from within is to be considered as lawless and occurs without cause. There are diverse causes for the release of latent energy, but ordinarily the cause is some sensory activation from lower centers which results in the release of a neuronic discharge to a cortical pattern. Sometimes it may be the result of the activity of the endocrine glands or of hunger.

Elsewhere Herrick [7] again states that: "Animals utilize the energy reserves which have been built up by plants and stored away as food materials, and in their own activities they further extend the anergic process by the elaboration of nervous systems and the other apparatus of very complex behavior, whose potentialities when realized in the functioning of these highly differentiated tissues return the energy to a lower level as mass movement, heat, and other inorganic forms of activity. And in mankind this final katergic process, in turn, is adapted to step up lower energies to the plane of intelligent adjustment, setting them to work to invent and run machines, to maintain commerce and all of the other varied industries necessary to advance personal and social welfare, much as in a dynamo, and step it up into a current of higher potential better adapted to do the work of some particular machine." One of the most distinctive features of higher animals is their ability to take in the raw materials of the vegetable world and build up higher potential energy than can ever be reached by any plant. Then this energy is released again in the form of behavior on the part of the animal that is adequate to cope with environmental conditions and satisfy cravings and needs of the organism.

Thus it may be seen that the impulsiveness, spontaneity and persistence of purposive behavior mentioned in the previous section of this chapter are partly due to the fact that there are stored up in the organism reserves of vital energy. How this energy is stored and how it may be released and particularly how it may be properly directed constitutes one of the most important problems in the study of human behavior.

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[7] Herrick, C. J. Neurological Foundations of Animal Behavior, p. 49, 1924. By permission of Henry Holt and Co.

(2) Kempf's Theory of Cravings of the Body-Segments. Kempf[8] has given a very interesting and rather complete theoretical explanation of the dynamics of behavior in terms of the functions of the autonomic nervous system. As was pointed out in Chapter V the nervous system may be divided into two main divisions, the central or cerebrospinal system and the autonomic system. Roughly speaking the cerebrospinal system controls the system of striped or voluntary muscles, such as are found in the general skeletal musculature. The autonomic system governs the unstriped or involuntary muscles, as found in mechanisms for respiration, circulation, regulation of bodily temperature, digestion and endocrine secretions. Now, according to Kempf, it is the cravings of these autonomic segments that account for the "why" of behavior. The cerebrospinal system including its connections with effectors explains the "how" of behavior by determining the means by which the cravings can be satisfied. If some autonomic craving is aroused in order to compensate for a low metabolic level as in the case of hunger or through the effect of some external stimulus as in fear, then the cerebrospinal mechanism is compelled by the autonomic system to shift the organism in relation to its environment so that the organs of stimulation concerned will come in contact with such stimulation as will result in stabilizing the autonomic derangement. This orientation of the organism in the environment with respect to its segmental deficiencies is done in such a manner as to give the highest degree of satisfaction of needs with the lowest expenditure of energy through a proper coordination of skeletal musculature.

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[8] Kempf, E. J. The Autonomic Functions and the Personality, 1918.

(3) Cannon's Theory of Emotions as Reservoirs of Power. Cannon [9] indicates that the emotions constitute the great reservoirs of power which are drawn upon in the periods of crisis and excitement of everyday life. One of the best examples is in the competitive sports. In the case of a football game we have an excellent example. The game is well advertised; loyal alumni and friends travel a long distance to see the contest; meetings of students in residence are held for the purpose of demonstrating their loyalty to the team; lively music is played; vigorous cheering is participated in; and every one is in a high state of excitement the day before the game begins. This has a strong effect upon the members of the team. Even though they may not participate in the preliminary "pep" meetings, they cannot prevent being affected by the general atmosphere of the so-called school spirit. Then when the hour arrives for the opening of the game, the team is brought upon the field amid more rousing cheers, waving of flags, and the playing of martial-like music. This series of exciting events has brought about certain bodily changes, as has been shown by chemical tests, that completely remake the players. They are already strong, in good health, and have a high degree of vigor and endurance. But these physiological changes make it possible for them greatly to increase the output of energy over what they would be able to expend under ordinary circumstances. It would appear, that, everything else being equal, the winning team will be that team whose coach and loyal supporters can create the most excitement prior to the game and during the playing of it and the individuals

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[9] Cannon, W. B. Bodily Changes in Pain, Hunger, Fear and Rage, p. 216 ff., 1920.

of which can store up the greatest amount of bodily reserves for the struggle.

The same conditions hold, according to Cannon, in other types of human behavior where endurance is required. The long dancing ordeals of the primitive rituals are gone through with only because of the frenzied state of the participants before and during the event. This is brought about by singing, shouting, leaping, wild gesticulating, and by the presence and active encouragement of fellow dancers and spectators. In the same way the endurance of extreme pain and hardships in battle is made possible, among other factors, by the playing of rousing strains of martial music on brass instruments and drums. It is alleged that certain European soldiers are very ineffective until their bands begin to play, then they are the best on the continent.

In this connection Smith and Guthrie[10] indicate that in all forms of behavior, with the exception of routine habit, which are engaged in persistently there must be an emotional reinforcement. Even routine habit itself is established at the beginning by the aid of some emotional drive. And in such activities as playing of games, engaging in dangerous sports, entering into controversies, or participation in any kind of hazardous enterprise, whether it be in business or in mere physical activity, the energy with which the reactions are made is due to the emotional drive aroused by the situation.

(4) Witty and Lehman's Theory of Drive as Compensation for Weaknesses. Witty and Lehman,[11] in the study of the gifted individual, have suggested that one of the factors of dynamic behavior is the influence of the desire to com-

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[10] Smith, S. and Guthrie, E. R. General Psychology in Terms of Behavior, p. 212, 1921.

[11] Witty, P. A. and Lehman, H. S. "Drive: A Neglected Trait in the Study of the Gifted." Psychol. Rev., 1927, 34, 364-376.

pensate for some weakness in behavior. If failure results from some effort on the part of the individual which in turn brings rebuke, chiding, censure, etc., from members of his own social group, he seeks to find a successful means of self-expression along other lines of endeavor. He goes at this new task with such tremendous energy and determination that his achievement is frequently of a decidedly superior quality. For this reason, these authors claim, works of genius may be produced by individuals of mediocre ability.

(5) Dewey's Theory of Drive in Terms of Interest. In his book on *Interest and Effort in Education,* Dewey [12] signifies that the underlying dynamic principle of behavior of the child is interest. He does not undertake to state what is the exact physiological nature of interest. However, he is quite certain that in order that the energies of the child may be harnessed up and applied along the lines of educational procedure, the educational activities must be compatible with its prevailing interests. In this connection he makes the following statements: "The genuine principle of interest is the principle of the recognized identity of the fact to be learned or the action proposed with the growing self; that it lies in the direction of the agent's own growth, and is therefore, imperiously demanded if the agent is to be himself. . . . Genuine interest, in short, simply means that a person has identified himself with, or has found himself in, a certain course of action. Consequently, he is identified with whatever objects and forms of skill which are involved in the successful prosecution of that course."

In discussing the nature of interest, Wapples [13] makes a similar statement: "That interest in the given individual which best serves the educational purpose may therefore be roughly indicated by the ends in a given environment which he habitually puts forth most effort to attain and with which he habitually identifies himself."

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[12] Dewey, J. Interest and Effort in Education, pp. 7, 43, 1913. By permission of Houghton Mifflin Co.

[13] Wapples, D. "An Approach to the Synthetic Study of Interest in Education." J. of Educ. Psychol., 1920, 11, 502. By permission of Warwick and York.

One of the writers[14] carried on an investigation of the interests of students to throw further light on Dewey's theory of interest. It was the purpose of this study to determine the relation of interest to educational achievement. The achievement of some 750 college students was analyzed to answer the question. The students were divided into groups according to their major educational interests. Then their achievement in terms of teachers' marks was correlated with their interests as indicated by the choice of subjects for study in college. It was found that there was a fairly high degree of correlation between the choice of subjects and scholarship attained. In other words, the students tended to make their highest grades in their major and closely related subjects and their lowest grades in other subjects.

Thorndike[15] studied the relation of achievement of college students to their preferences for school subjects as indicated in a questionnaire. From the results he concluded that there was a very close relationship between interest and the effort put forth by a group of college students in the subjects studied.

(6) Thorndike's Theory of Drive in Terms of Physiological Readiness. Thorndike[16] undertakes to account for the dynamics of behavior in terms of the physiological readiness

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[14] Wilson, M. O. "Interests of College Students." Amer. J. Psychol., 1927, 38, 409-417.

[15] Thorndike, E. L. "Permanence of Interests and Their Relation to Abilities." Pop. Sci. Mo., 1912, 81, 441.

[16] Thorndike, E. L. Educational Psychology (Briefer Course), pp. 53, 55, 1914. By permission of the author.

of the stimulus-response mechanisms involved. "By original nature a certain situation starts a behavior-series: this involves not only actual conduction along certain neurones and across certain synapses, but also the readiness of others to conduct. The sight of the prey makes the animal run after it, and also puts the conductions and connections involved in jumping upon it when near into a state of excitability or readiness to be made. Even the neurone-connections involved in the response of 'clutching' to the situation of 'jumping and reaching it' and those involved in triumphing over it or taking it to one's lair are in a different condition when a chase is started than they otherwise are. The activities of the neurones which cause behavior are by original nature often arranged in long series involving all degrees of preparedness for connection-making on the part of some as well as actual connection-making on the part of others. When a child sees an attractive object at a distance, his neurones may be said to prophetically prepare for the whole series of fixating it with the eyes, running toward it, seeing it within reach, grasping, feeling it in his hand, and curiously manipulating it." In summarizing his view in this connection, Thorndike makes the following statements: "I believe that the original tendencies of man to be satisfied and to be annoyed—to welcome and reject—are described by these three laws of readiness and unreadiness: (1) that when a conduction unit is ready to conduct, conduction by it is satisfying, nothing being done to alter its action; (2) that for a conduction unit ready to conduct not to conduct is annoying, and provokes whatever responses nature provides in connection with that particular annoying lack; (3) that when a conduction unit unready for conduction is forced to conduct, conduction by it is annoying."

Grindley [17] holds a view similar to that of Thorndike and in a recent writing undertakes to give a statement as to the nature of physiological readiness. He takes the case of a hungry chick seeking food to illustrate his point. Suppose that the chick has had nothing to eat for a period of time and is placed within a plot of ground where it can move freely about. If no other behavior cycle is introduced which is more prepotent than that of seeking food, the chick will start walking about looking in all directions for food and occasionally will stop to scratch in the earth. Small food objects, when coming into view, will be picked up and swallowed. After a certain amount of the particles have been swallowed, the fowl becomes less and less active and finally food seeking and eating movements cease.

Grindley narrows the problem down to that in which the chick alternates between walking about to seek food and stopping to scratch in the earth until sufficient food has been found to bring the food seeking cycle to a close. If the actions of walking about are effected through the discharge of a complex system of motor neurones designated as A and the actions of scratching are due to the discharge of a motor system designated as B, evidently the system A and B must be connected with each other and both in turn are connected with a common system of sensory neurones. The question to be answered, then, is why the chick alternates between the two modes of response when it is hungry.

Both of these groups of responses, A and B, seem to be due to the fact that the chicken has not had food for several hours, or is in a state of hunger. Evidently there is a powerful system of cells designated as E-cells in the nervous system of the chick which are always stimulated when it has gone without food for some time. The E-cells must be connected with the A and the B response mechanisms, since stimulation of E always results in the excitation of A and B.

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[17] Grindley, G. D. "The Neural Basis of Purposeful Activity." Br. J. Psychol., 1927, 18, 168-188.

Now an explanation of the alternation between walking and scratching may be suggested by the explanation of alternating reflexes, which Sherrington [18] discussed in his writings, namely the refractory phase [19] of the organs of connection. It was pointed out in Chapter V that the refractory phase is one of the functional characteristics of a neurone. By it is meant the tendency of a connecting organ to depreciate in irritability with continued stimulation. It may be assumed that there exists a reciprocal relation of inhibition between system A and system B, the result of which is that while E may excite both A and B, it can excite only one at a time. Suppose that resistance of the EA pathway is less than that of the EB pathway. Then E excites A more strongly at first than it does B and the activity B is inhibited as the chick walks about seeking food. After a time, however, the A-system enters into its refractory phase and its inhibitory effect upon the B-system is gradually decreased. But all the while the B-system has been excited by the E-cells and as the inhibitory effect of A decreases, a point is reached at which B becomes dominant over A and inhibits it. This cycle is repeated over and over again until sufficient food is secured to satisfy the needs of E, or fatigue, or some other behavior cycle becomes prepotent over the food-seeking cycle and the latter ceases.

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[18] Sherrington, C. S. Integrative Action of the Nervous System, p. 200, 1906.

[19] Dodge, R., has also elaborated this theory in his writings, one of which is "The Refractory Phase of the Protective Wink Reflex." Amer. J. Psychol., 1913, 24, 1-7.

(7) The Authors' Theory of Drive in Terms of Physiological Readiness. In surveying these various theories of the nature of drive, there is found to be much truth in each one of them. It is the view of the authors, however, that a theory of physiological readiness supported by Grindley provides the best explanation of the purposive behavior of boys and girls. It is granted that in this explanation, there is much that is not explained. But, as may be said of all hypotheses, nothing is explained in its final analysis.

It is held by the present writers that when John purposes to build a bookcase he is in a state of physiological readiness to react along this particular line. He is not in a state of readiness to build a bobsled, an ironing board, or to mow the lawn. And after he has built one bookcase, he may choose not to build another bookcase because he is not in a state of readiness to react along this particular line of activity. This lack of readiness is due to the fact that he has been working at his bookcase for several days and there has been set up an anti-concomitant attitude toward the building of bookcases because the system of neural connections involved in this activity have been overstimulated or, in other words, may have entered into the refractory phase.

In the third section of the book, suggestions and examples of how to secure a state of readiness on the part of the child to do a certain thing will be discussed. It will be sufficient to state at this time that it can be done by increasing the intensity of stimulation and by directing the activity of the child so that success will attend its efforts. For example, if it is desirable that John build a bookcase, he may be stimulated to perform this activity by giving suggested plans for building a bookcase, aiding him in finding suitable materials and securing the requisite tools, and by pointing out to him the uses that can be made of the finished product. As examples of the latter, it may be suggested to him that he can take the case home when it is finished and use it in shelving his books for home reading, or he may present the case to his parents as a gift. Finally, the teacher must see to it that success attends John's efforts in building his bookcase.

4. A Diagram Illustrating the Nature of Purposive Behavior. Figure 7 is a diagram representing the nature of purposive behavior. The S stands for the stimulation and direction of the child which is provided by the teacher and the school. The R represents the activity of the child along the line of a prevailing drive. The circle stands for the dynamic, purposive child. In order for the best results to be obtained in education, the purposive nature of the child must first be recognized. Lines of activity must be provided where the child can express itself in a manner which is harmonious with its prevailing drives. It is the function of the teacher to stimulate the child and direct its behavior toward the realization of its goals and to see that success attends its efforts.

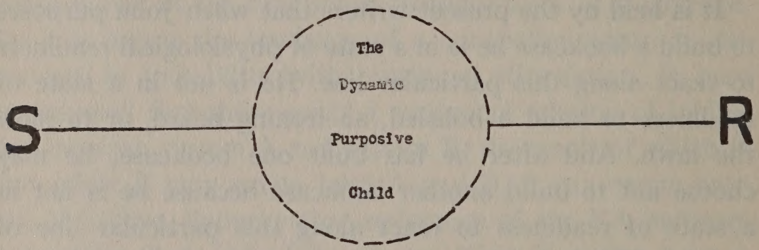

FIGURE 7.—A Schematic Representation of the Nature of Purposive Behavior. (The circle represents the dynamic and purposive nature of the child. The "S" symbolizes the stimulating environment in which the child lives. The "R" represents the purposive responses the child makes to its stimulating environment.)

5. The Kinds of Drive. Psychologists usually recognize two groups of fundamental factors in the dynamics of behavior. The first is that group known as physiological drives. A physiological drive is an inner urge or state of readiness to satisfy some organic need. The human body is made up of physiological mechanisms which have certain needs that must be satisfied. The individual in primitive life goes about to satisfy his organic needs in a very simple manner. In the tropics his food is already prepared for him in the form of fruits and nuts and about all he has to do is to gather it in as his hunger demands. There is little necessity for the cultivation and harvesting of crops. Other demands, such as for protection and security, are supplied by equally simple means. In a cultured society we find the same types of physiological needs but they are provided for in a more complex way. The physiological drives constitute a large number of the motivating conditions in the life of the individual.

The second group of factors of dynamic behavior is that group known as social drives. A social drive is an inner urge or a state of readiness to satisfy some need in relation to other individuals. These drives are more difficult to isolate and describe than the physical drives. However, we are certain that much of human behavior arises out of the needs of the interrelationship of individuals. Many of the more important forms of individual behavior would be impossible except in situations where other individuals were involved. Most of the drives of children with which the teacher will come in contact are of the social type.

6. Illustrations of Physiological Drives. There are, according to Perrin,[20] at least three fundamental physiological drives in human behavior, namely, those concerned with eating and hunger satisfaction, with sex satisfaction, and with the demand for physical comfort. There are perhaps others but these will suffice to illustrate the driving power of bodily needs. In discussing them it must be kept in mind that they are not mutually exclusive but overlap. The analysis is only for the sake of convenience.

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[20] Perrin, F. A. C. "The Psychology of Motivation." Psychol. Rev., 1923, 30, 176-191.

Activities concerned with securing and eating food are almost unlimited as to number and complexity. If we consider all of the strivings of the various human agencies in the production and preparation for a mere loaf of bread we can readily see how important is this type of motive. The farmer clears the soil, plants, and harvests the crop of corn or wheat. These activities require the use of much horse power and machinery. At industrial plants where the grain is ground very elaborate machinery is employed and the time of hundreds of men is required to operate the machinery. Then the bread must be sent to the bakery where additional machinery and men are required to bake the loaves and wrap them properly. It is finally delivered to the home. After the bread is delivered to the home the mother or servant must make further preparation before it is ready to be served on the table.

In a symbolic sense, men fight and die for a loaf of bread. If one nation encroaches upon the economic rights of another, among which may be the regulation of the supply and consumption of bread, then war may be declared which takes a toll of many lives. Thus, we see the importance of the drive to satisfy hunger.

If we consider sex motives in a broader sense, they may include drives involved in behavior ranging all the way from securing a dancing partner at a student dance to rearing a family. The young man woos and wins his dancing partner and they are joined in the bonds of matrimony. Then plans are entered into for building a home. Children come and must be cared for in the helplessness of infancy and illness. They are soon ready for school and preparation must be made for their educational careers. A volume could be written on the dynamics underlying the striving of parents to train their children so that they may be socially, economically, and biologically fit to meet adequately all of the demands to be made upon them in adult life.

Equally complex and far-reaching are the drives underlying the satisfaction of needs for physical comfort. Homes must be built which are equipped with thermostats, running water, electric lights, and elaborate furnishings. Telephone, radio, telegraph, and mail service provide almost instant communication with the outside world. In traveling there must be comfortable automobiles and pullman cars. This calls for paved streets and highways and the development of elaborate railway systems. At terminals there must be provided well-equipped hotels with a retinue of personal servants, or auto camps with tents and kitchens for the convenience of tourists. Likewise, we must have elaborate clothing. A special suit for every occasion must be provided. This demand is met by the efforts of a large group of manufacturers, tailors, retail merchants, and those leaders who dictate the styles.

As was indicated above most of the drives directly involved in education are of the social type. However, the physiological drives are indirectly involved in most of the activities of boys and girls. Perrin, referred to above, indicates that all physiological cravings have become intellectualized and socialized. This is because they originate in an individual who has reached a complex stage of intellectual and social development and can, therefore, be best expressed in an ideational and social background. Therefore, the physiological drives are highly important in the understanding and control of the behavior of boys and girls, although they function only indirectly in the school.

7. Illustrations of Social Drives. Much of the behavior of boys and girls arises out of their interrelationships with one another and adults. The child, according to Woodworth,[21] finds that other human beings are interesting stimuli to be responded to and enters into the cooperative relationship with them with pleasure. There have been various attempts to analyze the dynamic social tendencies into constituent drives. The following are some types of social drives which have been isolated: Fear of enemies brings people together in times of threatened danger; economic needs bring organization and cooperation in production; self-assertive and submissive tendencies develop leaders as well as followers; expansion of self interests so as to include larger units results in what is known as loyalty; and the parental motives, when extended to include a desire to help needy individuals other than helpless children, produce self-sacrifice and altruism.

Whatever may be the nature of social drives, there is one drive which seems to stand out rather clearly, namely, the desire of the individual for recognition by others with whom he associates. As Perrin and Klein [22] point out, this recognition is particularly desirable on the part of the individual if it comes from one who is capable of bestowing prestige. One very important factor in the selection of a vocation is the prestige which is attached to it. A lawyer will frequently give up a very lucrative practise in order to assume judicial duties because the latter type of office is usually held in higher esteem. Early childish ambitions with respect to a vocation are determined to a large extent by the child's appraisal of the vocation in terms of the recognition it receives. Almost every boy at one time or another aspires to be a clown in the circus because the clown attracts most of the attention of the spectators. The same is true concerning the cowboy, the movie actor, or the soldier, especially in time of war. In school the child likes to do those things at which it can succeed for the mere sake of doing them and for the end results achieved. But it likewise is desirous of success because success brings recognition from the teacher and from other pupils.

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[21] Woodworth, R. S. Dynamic Psychology, p. 204f, 1918.

[22] Perrin, F. A. C. and Klein, D. B. Behavioristic Psychology, p. 183ff., 1926.

There is one point at this stage of the discussion which certainly should be kept in mind. That is, when the child reaches adulthood it must live in a social environment. Therefore, the training of the child should be carried on under socialized conditions. As will be pointed out particularly in Part III of the text, this is amply provided for in a program which recognizes the purposive nature of the child. The child is a member of a democratic society and organization. It has its own part to play in the initiation, choice, and evaluation of the goals to be worked for. In the Junior High School of the University of Oklahoma, where the purposive program of education herein advocated has been operating for several years, the children work out their problems in a social setting which is as nearly true to the everyday life of the child as can be provided. Under proper guidance and stimulation by the teacher, they settle all difficulties, initiate goals, set up ways and means, and initiate improvement in procedure, according to the rule of the majority. In other words the program of education as based on the purposive activity of boys and girls provides training in the art of being a good citizen. The school is a miniature democracy in which the voice of every child may be heard and considered in the solution of problems which arise among the boys and girls.

8. Characteristics of Behavior with a Drive. *(1) Purposive Behavior Is Spontaneous.* As McDougall[23] has stated, purposive behavior has certain characteristics. The first is that purposive behavior is spontaneous. It comes from within rather than from without; from some internal energy or inner urge rather than from some external force. Such behavior is exhibited only in living things. Any mechanism without power generated by disposable energy is inactive, dead. In the simple reflex reaction, where there is a direct response to some stimulus which is present, the energy is soon expended and there is no irradiation of energy to other parts of the body. As soon as the external stimulus is withdrawn the response ceases. But in purposive behavior the reaction gathers momentum, so to speak, as it progresses toward a goal and the energy is frequently out of all proportion to the strength of the stimulus. It is granted that such reserve force must be released by some stimulating condition which is external to the energy source. That is, there can be no response without the presence of some biologically adequate stimulus. But, once the reaction process is initiated, it proceeds toward some end-result or goal with such force as will tend to overcome all barriers to its realization.

In this connection, consider the behavior of John when he purposes to build a bookcase. A mere suggestion from John's teacher or his parents or from a book he has read may be sufficient to start him off in the direction of bookcase building. Ideas of how the case should be built, the kinds of material to use, the tools needed, where all of these requisites may be secured, and the construction of the bookcase seem to come from internal urges. Whatever may be the immediate stimulus which initiated the process of building the bookcase, the interesting phase of it to be observed is the zeal with which he goes at the task, the vigor with which he works at it, and the self-denial under which he goes in order that he may complete the job.

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[23] McDougall, W. Outline of Psychology, p. 43ff., 1923.

It is held by the present writers that when the solution of a problem is entered into with a definite purpose arising out of some inner urge on the part of the child, the solution will be gained with less expenditure of time and energy, and the effects will be retained over a longer period of time than when the purposing comes from some extraneous source, say the parent or teacher, and the response is the result of compulsion and coercion. More will be said about this point in Chapter IX, where some experimental evidence will be given to support this contention.

(2) Purposive Behavior Is Variable. A second characteristic of purposive behavior is that it is exhibited in the form of a varied attack upon the problem provoking it. Thorndike,[24] in discussing his subsidiary laws of learning, calls it the principle of 'multiple response.' The child is not only spontaneous in its reaction to the problem but it puts into play a multitude of different reactions among which is the one which is to bring success.

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[24] Thorndike, E. L. Educational Psychology (Briefer Course), p. 143, 1914.

In the case of John as he goes about the task of building the bookcase, different plans are considered, various types of material to be used are evaluated, the use of unfamiliar tools are mastered, more or less, and when the structure of the bookcase is finished, different kinds of paints and varnishes are tested until the desired effect is obtained.

(3) Purposive Behavior Is Persistent. A third mark of purposive behavior is that it is persistent. Some biologically adequate stimulus sets the given behavior system to work in the direction of the goal. Then the initial stimulus may be entirely lost sight of, but the behavior proceeds, sometimes in an orderly fashion and sometimes at random, until the goal is reached, until the individual is more or less exhausted, or until some more prepotent system of stimulation is introduced which calls for a different form of behavior. This persistence is observed in any of the fundamental forms of dynamic behavior mentioned earlier in this chapter. The organism will secure food or die in the attempt. A sex-object will be sought with tenacity of purpose until it is found. The same is true of behavior leading to the securing of needed physical comforts or social goals.

John returns to his bookcase day after day and takes up the work each day where he left off the day before. He labors with his plans until they are satisfactory; he cuts and tries the parts of the bookcase until they fit together properly; he denies himself many pleasures or other goals; he does not cease his efforts until the bookcase is completely finished.

(4) Purposive Behavior Ceases on Completion of the Consummatory Response. A fourth characteristic of purposive behavior is that it usually terminates as soon as the consummatory response has been effected. Or, if the cessation of activity does not occur, there is a redirection of

behavior toward a new and more remote goal. When John has completed his bookcase he ceases for a time all activities involved in building bookcases.

One peculiarity of human behavior, however, is that frequently our aims and ends exist only in performing the task. The product is thrown aside as soon as it is finished. We want what we are told we cannot have. Our fancy for an object wanes or is lost as soon as we discover that it is within our reach. Frequently, an end becomes a means to further ends. We no sooner reach our goal than we launch out on another more difficult conquest, using the gains of previous experiences to improve our mode of attack.

(5) Purposive Behavior Is Unitary. A fifth characteristic of purposive behavior, which may be added to the four above suggested by McDougall, is that it is unitary. It is the whole child which responds to the situation. The inner urge dominates the whole behavior of the child and every energy is bent in the direction of realization of the goal. If it is a case of a physiological need, say the need of food, it is the unit child which responds in this direction. Likewise in the case of any other purposive act, the unit child strives to secure the desired end. A more complete discussion of this phase of behavior will be given in Chapter VIII on the Unity of Purposive Behavior.

(6) Purposive Behavior Is Modifiable. A sixth characteristic of purposive behavior is its modifiability. When the child reacts along the line of its prevailing drive, its behavior is modified or conditioned. If the child can be stimulated and directed, under proper supervision, to read good literature rather than undesirable literature, then its behavior eventually will be so conditioned that desirable literature will be chosen without the guidance of the teacher. A full discussion

will be given of this character of purposive behavior in Chapters VIII and X on the conditioning of purposive behavior.

9. **Summary.** A study of the organs of stimulation, response, and connection explains the "how" of behavior, but it does not reveal the "why" of behavior. In order to answer the latter question it is necessary to consider the dynamic nature, or the drives, of the child. A drive is a state of physiological readiness of the child to respond along a particular line of activity.

There are various theories concerning the nature of drive. Herrick maintains that one essential feature of dynamic behavior is a reserve of vital energy. A stimulus applied to the organism liberates this energy, which expends itself in some particular direction. Kempf indicates that the dynamics of behavior can be explained in terms of the cravings of autonomic segments of the body. When the individual has a drive to respond along a certain line there is a lack of equilibrium in some fundamental process of the body which requires a reaction of the organs of response that will orient the body with respect to the environment in such a manner as to restore the state of equilibrium. According to Cannon, much of the striving of human beings is due to the outlet of energy stored up in the body as a result of emotional excitement. Witty and Lehman are of the opinion that much of the drive in human behavior is due to a desire to compensate for weaknesses. Dewey indicates that the explanatory principle for drive is the interest of the child. The child identifies itself with whatever forms of skill, objects, or situations which are involved in the realization of a desire. Thorndike, Grindley, and the present writers hold that drive is a state of physiological readiness on the part of the child to respond along a particular line of activity. All of these theories are in some degree of harmony with each other.

Drives are of two kinds, physiological and social. Most physiological drives have become intellectualized and socialized, so that in the education of the child social drives have come to be the more important. The program of education should be so organized that the child can give expression to its dynamic nature in social situations, since the child is living and will continue throughout life to live in a social environment.

There are several earmarks of purposive behavior. First, it is spontaneous, that is, it results from internal urges rather than external compulsion. Second, it is variable; there is a multiplicity of responses which includes the consummatory response. Third, it is persistent; it does not cease until the goal is reached or until a more prepotent drive is introduced. Fourth, it ceases when the consummatory response is effected. Fifth, it is unitary; the whole child rather than a part of the child is involved in effecting the goal. Sixth, it is modifiable or can be conditioned. And modifiability is the basis of all learning.

CHAPTER VII

MECHANISMS OF PURPOSIVE BEHAVIOR: THE UNITY OF BEHAVIOR

1. **The Child Reacts as a Unit in Purposive Behavior.** In Chapters III, IV, and V, it was shown that a mechanism of purposive behavior consists of three fundamental parts, namely, the organs of stimulation, the organs of response, and the organs of connection. These organs were analyzed to some extent but it was pointed out that this analysis was only for the sake of convenience in the discussion. In reality the function of these organs is interrelated, which brings us to the point of the present chapter, namely, the unitary character of purposive behavior, which was mentioned in Chapter VI. When a child has a drive to respond along a certain line of behavior, the behavior of the *whole child* is involved.

This unitary character of behavior is always present when the endeavor is carried on as a result of some inner urge. The animal, in seeking food or a sex object, bends every energy in the direction of the realization of the goal. It is likewise with the child. If a physiological need is being satisfied it is the whole child that strives in this direction. If a social goal is being sought for it is the unit child that reacts to this end. This characteristic of purposive behavior is well illustrated in the play activities of boys and girls. When a boy purposes to play tennis, the execution of the game is characterized by the harmonious interaction of all of the organs of behavior. The organs of stimulation involved are in a state of readiness to function in a way that will contribute to the successful playing of the game. The organs of response are in a state of readiness to react in such manner as will make for the progress of the game. Likewise, the organs of connection are in readiness to interconnect the stimulus organs and response organs so that the game can be successfully executed and consummated. The highly coordinated behavior exhibited here is due to the interaction of all of these organs.

In a similar manner these organs function in unitary fashion when John builds the bookcase which he has purposed to build. If John has a real drive for building the bookcase, it is the whole boy which executes the plans and consummates the task.

As Gates[1] points out, this integration or unity of behavior is present in innate as well as acquired forms of behavior. The child can make many responses at or shortly after birth, such as moving the legs, feet, toes, arms, hands, fingers, trunk, head, and vocal organs. When it sees an object and reaches for it, many of these responses are so coordinated as to make possible the successful completion of this complex response. Likewise in the case of acquired reactions the behavior is integrated. This was pointed out in the case of building a bookcase or in playing games, as in tennis, baseball, rowing, horseback riding, and riding a bicycle.

Education based on the purposive activities of boys and girls contrasts sharply with the traditional type of education, particularly with respect to the fulness with which the

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[1] Gates, A. I. Elementary Psychology, p. 72f., 1925.

child enters into the activities of the school. For example, consider the relative degrees of participation, when, on the one hand, the child is assigned the task of learning the multiplication table, and on the other, it purposes to determine how Mr. Smith computed the cost of building his residence. In the one situation, only segments (so to speak) of the child are involved; in the other, the whole child is working. In the one the behavior is fragmentary; in the other it is unitary.

2. **The Physiological Basis of Unitary Behavior.** The basis of the unitary behavior of the child is the tendency of the nervous system to function as a unit rather than in isolated parts or segments. There are several physiological factors underlying this unitary functioning of the nervous system which we may profitably consider at this time. In commenting upon the general question of the basis of integration Herrick [2] makes the following statement: "The integrative functions are of several sorts, most important of which from our standpoint are the phenomena of excitation and conduction. . . . Excitation is fundamentally protoplasmic reaction to stimulus involving rapid metabolism, a dynamic change which irradiates throughout the surrounding protoplasm in diminishing gradients. This conductivity is the key to the integrating power or organismic functions of this type. . . . The unity of the organism in all complex animal bodies appears to be dependent upon the presence of highly efficient conducting apparatus, namely, the nervous system, whose radius of transmission is wide, perhaps indefinite in higher animals, and within which the decrement of the energy of the physiological gradients form the center

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[2] Herrick, C. J. Neurological Foundations of Animal Behavior, p. 249ff., 1924. By permission of Henry Holt and Co.

of highest dominance to the outlying organs, is small or absent. Thus the dominant center in some measure controls the growth and activities of the entire body and insures its integrity."

"The nervous system . . . exerts a dominant regulatory control over the entire body by a combination of two physiological features, both of which are present in the most primitive organisms, but which come to expression in higher animals in very distinct forms. These are: (1) innate arrangement of the tissues with related excitation-conduction gradients organized in very intricate patterns of sense organs, nerves, correlation centers, and organs of response and manifested in behavior as reflex and instinct; and (2) individual plasticity or modifiability of behavior, appearing in its higher forms as memory, association, intelligence."

Some of the specific arrangements of the nervous system providing for the unity of behavior are as follows: Diffusion and convergence of nerve impulses, gradations of activity in the nervous system, and physiological dominance.

(1) Diffusion and Convergence of Nerve Impulses and Unitary Behavior. As Gates[3] points out, the organs of connection are so organized that an impulse aroused at any organ of stimulation theoretically may be conducted to all organs of response. If all synaptic junctions were open any stimulus might arouse all responses which the body is capable of making. The converse of this is likewise true. The nervous system is so organized as to make possible the convergence of impulses aroused at all of the organs of stimulation to a given organ of response. These phenomena may be called the diffusion and convergence of the nervous impulse. The extremes of these possibilities may never be

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[3] Gates, A. I. Elementary Psychology, p. 66ff., 1925.

secured in ordinary situations but under experimental conditions they can be demonstrated. However, even less degrees of diffusion and convergence make possible an unlimited extent of coordinated or unitary behavior.

In discussing the possibilities of responses through interconnections in the nervous system, Herrick[4] gives us an interesting chapter entitled "What We Do with Our Brains." A few statements from the chapter will indicate to what extent the process of divergence and convergence of nerve impulses is made possible.

"The known complexity of the lines of nervous conduction within even so simple a brain as that of a frog, if mapped out in detail, would make the wiring chart of the largest electrically driven factory look as simple as a county-road map. And if we turn to the human brain it is no exaggeration to say that a complete map of every circuit in all the telegraph and telephone lines of the North American continent would be incomparably simpler than such a chart of the nervous circuit of which we already have some knowledge. And the half of our nervous equipment has never been told. . . ."

"If a million cortical nerve cells were connected one with another in groups of only two neurones each in all possible combinations, the number of different patterns of interneuronic connection thus provided would be expressed by $10^{2,783,000}$. This, of course, is not the actual structure, as we shall see; but the illustration may serve to impress upon us the inconceivable complexity of the interconnections of the ninety-two hundred million nerve cells known to exist in the cerebral cortex."

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[4] Herrick, C. J. Brains of Rats and Men, p. 2ff., 1926. By permission of The University of Chicago Press.

"Every neuron of the cerebral cortex is enmeshed in a tangle of very fine nerve fibers of great complexity, some of which come from very remote parts. It is probably safe to say that the majority of the cortical neurons are directly or indirectly connected with every cortical field. This is the anatomical basis of cortical associational processes. The interconnections of these associational fibers form an anatomical mechanism which permits, during a train of cortical associations, numbers of different functional combinations of cortical neurons that far surpass any figures ever suggested by the astronomers in measuring the distance of stars. And in the cortical association centers it is the capacity for making the sort of combination and recombination of the nervous elements that determines the practical value of the system."

(2) Gradations of Activity in the Nervous System and Unitary Behavior. Another factor which provides a basis for integrated or unitary behavior is the gradations of neural activity or physiological gradients as they are usually called. These physiological gradients constitute lines of decreasing magnitude of vital reaction to stimulation. Neural centers which have a high rate of activity have a greater influence upon surrounding centers than do the centers less active. Hence they become focal points of dominance over the entire body. Herrick [5] states this principle as follows: "Transmission of excitations in nervous or any other protoplasm seems to pass from regions of higher excitability and more active metabolism toward less active regions, and regions of greater activity are physiologically dominant over regions of lower activity in so far as these regions are in

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[5] Herrick, C. J. Brains of Rats and Men, p. 203f., 1926. By permission of The University of Chicago Press.

physiological relationship through protoplasmic conductors."

(3) Physiological Dominance and Unitary Behavior. Perhaps the most important principle in the explanation of unitary behavior is that of physiological dominance. It is based on the principle of physiological gradients considered in the previous paragraph. In a graded arrangement of neural pathways or connectors the high end of the gradient is always dominant over other regions in that system of gradations. Herrick [6] defines physiological dominance as follows: "Regions of high excitability are regions of high metabolism and by reason of the conductivity of protoplasm these activated areas control the functions of all other parts within the range of their physiological influence. . . . Thus arise 'centers of physiological dominance,' that is, centers of high metabolism which set the pace for other bodily processes, and the parts of the body are by this means bound together and their activities integrated by an internal mechanism which is nothing other than the dynamic control of the entire process of living by those centers in which the most essential processes of excitation are working with highest efficiency."

In terms of the discussion of the previous chapter, the mechanism of the prevailing purposive act of the child is dominant over all other mechanisms. If the child is seeking food, the food-seeking mechanism is dominant over all other mechanisms. If it is seeking social recognition, this mechanism is dominant over all others. If John has a strong desire to build a bookcase, the fundamental activities leading to the consummation of this line of behavior are the dominant ones.

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[6] Herrick, C. J. Neurological Foundation of Animal Behavior, p. 55, 1924. By permission of Henry Holt and Co.

Consideration of the dominating character of the mechanism of a prevailing purposive act in the child indicates how important it is that education be carried on in terms of child purposing, child planning, and child executing. It is futile to attempt the training of the child unless the line of training is consistent with the dynamic nature of child growth and development.

3. The Rôle of Experience in the Integration of Behavior. Certain unit responses which are present at birth constitute the raw material from which unitary behavior is built. Illustrations of these units are hiccoughing, yawning, sneezing, movement of muscles of the head, face, eye, and tongue, movements involved in swallowing, crying, and vocalization, movement of trunk, legs, arms, and fingers as in grasping.

Unitary behavior results from the integration of these unit responses. In this connection Kuo[7] makes the following statement: "The random and chaotic movements of the new-born babe are the raw materials out of which our reaction systems are built. A most characteristic fact about them is their plasticity and their being capable of such varied combinations; under environmental demands they may be integrated and reintegrated into serviceable habits. From the thought activity of the genius of the age to our habitual acts of daily routine, all of our organized reactions have their origin in these elementary movements. Habit formation is simply an integration of these elementary acts into systematized responses, or, as in a later age of life, reintegration of old habits. What is new in a new habit is the combination; its component activities can be traced back to the beginning of the life of the organism. Genetic study should start with the investigation of these random acts and follow the ways in which they are integrated and reintegrated into various reaction systems as results of environmental demands. The importance of these random acts has not been recognized by psychologists. The conception of instincts which are supposed to burst forth from the organism from time to time without antecedents is largely responsible for this neglect. At present I believe the study of the nature of the units of reaction in the new-born child and the processes of their various integrations in the course of the continuous interaction between the environment and the organism is the key which will unlock the mystery of human nature."

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[7] Kuo, Z. Y. "How Our Instincts Are Acquired." Psychol. Rev., 1922, 29, 352f. By permission of the Psychological Review Co.

4. **Summary.** Purposive behavior is integrated and unitary. When a child has a drive to respond along a certain line, the whole child is involved in the response. This unity of behavior is present in innate behavior as well as acquired behavior. The basis of unitary behavior is the tendency of the nervous system to function as a unit rather than in parts. One principle underlying unitary behavior is the convergence and diffusion of nerve impulses. The nervous system is so arranged that it is possible for impulses from practically all the organs of stimulation to be converged to a single organ of response. Conversely, the impulse aroused by stimulating a given organ of stimulation may be diffused so that it can be propagated to practically all of the organs of response. Another basis of integration is the gradation of neural activity. Centers of nervous connections which are active are physiologically dominant over less active or inac-

tive centers. This accounts for the fact that mechanisms of prevailing purposive acts are dominant over other mechanisms and indicate the importance of planning the program of education in terms of the purposive nature of child behavior. Experience plays an important rôle in the integration of behavior. Certain units of behavior which are present at birth constitute the raw material from which unitary behavior is built through experience.

CHAPTER VIII

MECHANISMS OF PURPOSIVE BEHAVIOR: THE CONDITIONED MECHANISM

1. **Purposive Mechanisms.** The previous chapters have been concerned with the discussion of the fundamental organs involved in mechanisms of purposive behavior. First, there are the organs of stimulation. These organs are in a state of readiness to be stimulated by certain specialized modes of stimulation. Second, there are the organs of response. These structures are in a state of readiness to respond in a certain way when nervous impulses are carried to them from the stimulus mechanisms. Third, there are the organs of connection which effect a functional relation between the organs of stimulation and the organs of response. Lastly, it was pointed out that these specific organs are functionally interrelated so as to make possible a coordinated and harmonious reaction of the whole body. In other words, as John goes about the task of making a bookcase, his behavior is a unitary process. His whole body is involved in securing the end-result or goal. The analyses of Chapters II, III, and IV were only for the purpose of calling attention to the importance of specialized organs of stimulation, connection, and response. It was shown in Chapter VII that behavior is integrated; is unitary. Throughout the remainder of the book this point is to be kept clearly in view. It is the whole child with which we are concerned and not the functioning of isolated parts.

For convenience of discussion and practical application we may designate two phases of a purposive act, the drive and the response. A drive is the sum total of all energies involved in the initiation of a purposive act. The response is the sum total of all reactions involved in the consummation of a purposive act. Every unitary, purposive act is composed of these two phases.

2. **Purposive Mechanisms Are in a State of Readiness to React along Certain Lines.** The child has certain mechanisms which are in a state of readiness to function along certain lines of behavior. As a result of the drives the child is in a state of readiness to initiate goals to be attained. In Chapter XIII will be found an analysis of the lines of activity in the direction of which the drives may operate. (1) The child may initiate to participate in an excursion in order to determine "How Mr. Smith Makes Our Ice at the Ice Plant." (2) The initiation of the goal may be in the direction of communication. The child may desire to dramatize "Miles Standish" or "Evangeline." (3) The initiated goal may be along the line of construction. An opportunity for participation is sought by the child in building a bookcase, for example. (4) The drive may function in the initiation of a goal along the line of play activities. The child may wish to play a game of baseball or basketball with other children. (5) The drive may be operative in the initiation of a goal requiring the development of skill. The child may wish to become proficient in playing the piano or in singing.

As will be developed in Chapter XIII, the functioning of a drive can be divided into at least three parts, initiation of goal, initiation of means, initiation of improvement. In the purposive behavior of boys and girls the functioning of these phases of the drive can always be observed.

The response organs are in a state of readiness to respond along a certain line of behavior. Referring again to Chapter XIII it will be seen that the response organs may function along the same lines of behavior as the drive. Namely, excursion activities, communication activities, construction activities, play activities, and skill activities. The purposive behavior of the child is not complete until the responses have been made in relation to the various phases of drive mentioned above. In other words, opportunity must be provided for the child to make the necessary responses in the evaluation and choice of goals; evaluation, choice, and execution of means; and the evaluation, choice and consummation of improvement. In the complete functioning of the purposive behavior of boys and girls these phases of a purposive mechanism are always operative.

Some of the unit purposive mechanisms have already been considered in Chapter IV. One illustration of a purposive mechanism is that of grasping. Another is the mechanism involved in vocalization. A third is the mechanism involved in the contraction of the general musculature of the body. These are unit mechanisms of response. But they seldom if ever operate in isolation. They are integrated in higher complexes of behavior.

3. **Purposive Mechanisms Can Be Conditioned.** A purposive mechanism is modifiable or can be conditioned. It is in a state of readiness to react along a certain line of behavior. By the proper control of the conditions of stimulation and conditions of response the mechanism can be changed so as to respond along a different line of behavior. As will be shown later in the present chapter, both phases

of a purposive mechanism, drive and response, can be conditioned. A mechanism has been conditioned when it has been changed from a state of readiness to react along one line of behavior to a state of readiness to react along another line for which it previously lacked the requisite state of readiness. This process of conditioning is made possible by one functional characteristic of the organs of connection, namely, modifiability. For in Chapter V it was shown that a neurone, which is the structural unit of the nervous system, is modifiable at its synaptic junction with another neurone.

4. Illustrations of the Process of Conditioning a Mechanism. Various studies of the process of conditioning a mechanism have been made. Some of these studies have been concerned with the conditioning of a very narrow unit of behavior and others with the broader phases of behavior. A brief summary of a few of such studies will be reviewed here.

(1) Pavlov's Study of the Conditioned Salivary Mechanism. The classical example of a conditioned mechanism is that of the salivary mechanism of the dog investigated by Pavlov,[1] an eminent physiologist of Russia. Saliva is secreted by the salivary glands of the dog when food is placed in its mouth. Pavlov isolated a number of dogs from all distracting stimuli and set out to determine if these glands could be made to secrete saliva by any other mode of stimulation or *substitute stimulus*. He tried an auditory stimulus, presenting it simultaneously with the food. After a series of several simultaneous stimulations, he withdrew the food stimulus and presented the sound stimulus alone. He found

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[1] Morgulis, S. "Pavlov's Theory of the Function of the General Nervous System, etc." J. An. Behav., 1914, 4, 362-379; and Pavlov, I. P. Conditioned Reflexes: An Investigation of the Physiological Activity of the Cerebral Cortex, 1927.

that the saliva was secreted as a result of the sound stimulus rather than the food. He carried this phase of the problem further and attempted to secure the secretion of saliva when certain tones were presented. He was successful in this attempt and found that salivation would take place when a tone of a certain number of vibrations was presented but would not take place when a tone of slightly greater or smaller number of vibrations was presented. This process could also be brought about, he found, by other forms of substitute stimulus, such as presentation of various geometrical forms, and contact on the skin of the hind leg, simultaneously with the presentation of food.

(2) Cason's Studies of Conditioned Mechanisms. Cason[2] has made a study of the conditioning of a number of mechanisms, such as the eye-wink and the pupil of the eye. The eye-wink mechanism is in a state of readiness to react to several stimuli, among which is an electric shock. The response to this unconditioned stimulus is a sudden closure of the eyelid. Cason arranged a device for stimulating the eye in such a manner that winking would be elicited by presenting the sound and the electric shock. For example, he presented the shock stimulus and the substitute stimulus, sound, simultaneously for a series of trials. After a time the shock stimulus was withdrawn and the auditory stimulus was presented alone. He found that the eye-wink reaction had become conditioned so as to be elicited by the substitute or auditory stimulus, or, in other words, the eye-wink mechanism had developed a state of readiness to respond to a mode of stimulation for which it had hitherto lacked the requisite state of readiness to react.

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[2] Cason, H. "The Conditioned Pupillary Reaction," and "The Conditioned Eyelid Reaction." J. Exper. Psychol., 1922, 5, 108-146, and 153-196.

In a similar manner he was able to condition the pupillary mechanism. For substitute stimuli for this mechanism he used the sound of an electric bell, the buzzing sound of a telephone receiver, and an electric shock. After these substitute stimuli had been presented a number of times simultaneously with a light or a darkened stimulus, which are among the adequate or unconditioned stimuli for the pupillary reaction, he was able to get the conditioned reaction. That is, after the sound of the bell had been presented simultaneously with the light stimulus for several trials the pupil developed a state of readiness to contract although the light stimulus had been withdrawn. And when the sound of the bell was presented simultaneously with the darkened stimulus for several times the pupil had developed a state of readiness to dilate although the darkened stimulus had been withdrawn.

(3) Watson's Studies of Conditioned Emotions. Watson[3] has shown that emotional reactions can be conditioned very readily. Consider, for example, the emotion of fear. The child inherits few if any specific fears. It does, however, inherit a fear mechanism, that is, there are innate connections between organs of stimulation and organs of response, which when stimulated may result in flight or some other mode of behavior usually thought of as indicating the presence of fear. But there are few stimuli which will call out these fear reactions. Watson has found in the case of newborn infants that there are only two. First, a loud sound near the infant is an adequate or unconditioned stimulus for fear. Second, the loss of support as in the case of falling, being suddenly pulled or pushed, or a sudden pulling of the blanket upon which the infant was lying, was likewise adequate

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[3] Watson, J. B. Behaviorism, Lectures VII, VIII, 1926.

to call out fear reactions. There was no fear of darkness, furry animals, or of any kind of stimulation other than these two. When a rabbit was presented to a young child which was unconditioned with respect to this kind of stimulation, the reaction was almost invariably positive, that is, the child attempted to get nearer the animal, touch it, and manipulate it. But when the rabbit was presented simultaneously with the rapping of a steel bar producing a very loud noise the child reacted negatively, that is, it tended to withdraw from the rabbit. After these two stimuli had been presented simultaneously a few times, the appearance of the rabbit alone was sufficient to call out fear reactions.

(4) Watson's Theory of Conditioned Vocal Responses. Watson [4] is also of the opinion, and he has done considerable experimental work to support the opinion, that the conditioned response is at the basis of all thinking. Language begins with the use of unlearned vocal sounds that the infant makes at birth and subsequent to birth. Soon these responses become organized and are conditioned to various stimulations. Words finally become substitutes for objects. Before long the child has a word or verbal substitute for every object in the world about it. Later it learns to write and develops written substitutes for all objects. This spreads to various other modes of symbolic behavior, such as gestures, grimaces, drawing, painting, sculpturing. In all of these modes of expression there is involved some form of response organ. After these reactions have become thoroughly conditioned, the individual thinks in terms of the response of the mechanism involved in a stimulating situation. ". . . Whenever an individual is thinking, the whole

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[4] Watson, J. B. Behaviorism, Lectures IX, X, XI, 1926. By permission of W. W. Norton and Co.

of his bodily organization is at work (implicitly)—even though the final solution shall be spoken, written, or subvocally expressed verbal formulation. In other words, from the moment the thinking process is set for the individual (by the situation he is in) activity is aroused that may lead to adjustment. Sometimes the activity goes on in terms of (1) implicit manual organization; more frequently in terms of (2) implicit verbal organization; sometimes in terms of (3) implicit visceral organization. If (1) or (3) dominates, thinking takes place without words."

(5) Factors Affecting the Conditioning of a Mechanism. The facts and assumptions concerning the structure and function of the nervous system, which are fundamental to the conditioning of a stimulus-response mechanism stressed in Chapter V, are as follows: (1) The arborized terminals of nerve fibers provide the basis for a multitude of connections between organs of stimulation and organs of response through spread or irradiation of nerve impulses. (2) There is some form of resistance to the propagation of nerve impulses. It is probably determined by the degree of permeability of the cell membranes at the synaptic junction. For innate or unconditioned responses this resistance is very low. For any kind of responses that must be learned, it is high. This accounts for the fact that new responses are made with difficulty. (3) New connections can be formed, or learning can take place, because the permeability of a membrane increases with prolonged stimulation. (4) New connections can be retained for an indefinite period, since the increased permeability persists for a period of time. (5) New connections are eventually lost, or weakened, for the decreased permeability returns after stimulation ceases. This accounts for the so-called process of forgetting. (6) Young

cell membranes are more permeable than old, which accounts for the fact that learning takes place more readily in young people than in the aged. (7) Membranes differ as to their degree of permeability, which accounts for individual differences in the rate of learning, in the limit of learning, and in the degree of retention of what has been learned. (See footnote on page 143.)

With this physiological basis of modification of the nervous system in mind, let us consider under what conditions a new stimulus-response connection may be formed. Evans [5] has given a very clear and concise statement of these conditions. They are based on the findings of Pavlov, referred to above, and his students of physiology. These conditions or laws of the conditioned response have been restated in terms of education by Symonds.[6] In the following discussion we shall consider rather briefly some of these factors which seem to have particular bearing upon the problems confronting the educator.

(*1*) The fundamental law of the conditioned response is that the stimulation of any organ of stimulation simultaneously or in close temporal relation with the reaction of an organ of response results in the formation of a new stimulus-response bond or connection. This means that if an inadequate stimulus is presented at the same time with an adequate stimulus and the process is continued for some time the inadequate stimulus can finally be substituted for the adequate stimulus. For example, in the case of the salivary reflex of a dog, the sight of food is adequate to elicit the secretion of saliva. The sound of a bell is an inadequate stimulus, since there is no connection between the auditory organ and the salivary organ that is innately ready to function. But if these two stimuli are presented simultaneously for a number of times the sound of the bell soon becomes potent in calling out the secretion of saliva. Or, consider a child who is learning to talk and has gained sufficient control of his vocal organs to repeat simple words uttered by his mother. Pronouncing the word *horse* by the mother will result in the same response by the child. This is the adequate or unconditioned stimulus necessary for the response *horse* on the part of the child. Now, if the child sees a horse and the mother, as she points to the animal, says *horse* the child will utter *horse* as before. When this has been done a few times the sight of the animal will be followed by the same response by the child without the vocal stimulus from the mother. The sight of the horse has been substituted for the auditory stimulus. A boy, three years old, had learned the names of several of the states by hearing his father and mother repeat them. During the summer the family took an automobile trip from Missouri to California. On the way the child learned to identify the license plates of twelve or fifteen states. Every time he saw a new license plate the parents would tell him to which state it belonged and would point out the color combination. These colors became the new or substitute stimulus for utterance of the name of the state.

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[5] Evans, C. L. Recent Advances in Physiology, Ch. XIV, 1926.

[6] Symonds, P. "Laws of Learning." J. of Educ. Psychol., 1927, 18, 405-413.

(2) Another fundamental law is that the response must be repeated or exercised several times in the presence of the substitute or conditioned stimulus. The number of times repetition must take place varies with the individual and the response. The conditioned salivary response of the dog to auditory stimulation mentioned above had made its appear-

ance after nine stimulations and had become well established within thirty presentations of the stimulus. The child referred to above learned to respond correctly to the visual stimulus *horse* in perhaps a half dozen trials. In learning the combination $8 \times 9 = 72$, the child will have to solve several problems where this combination is present before the response to this stimulus will become thoroughly fixed. The same thing is true in learning the meaning of words. The individual who can interpret good literature, appreciate the finer shades of meaning conveyed, and modify his behavior in accordance with the import of it, is the individual who has done much reading of good literature. In situations where ethical or moral values are involved, the individual who responds adequately is the one who has had opportunity to make such responses many times before.

(3) The conditioned stimulus must precede or be simultaneous with the unconditioned stimulus if a conditioned reflex is to be formed. If the reverse relation prevails, that is, if the unconditioned stimulus precedes the conditioned stimulus, no conditioned reflex at all will develop. In the case of the conditioned salivary reflex, it was found that even if the two stimuli were separated only by a few seconds, no conditioning took place. In order to secure the best results in teaching it would appear from this principle that new material should be presented simultaneously with or should immediately precede the old material.

(4) Simultaneous presentation of the conditioned and the unconditioned stimuli results in the quicker formation of conditioned reflexes than when the former is followed by the latter after an interval of time. In the case of the child learning to say *horse* when it sees the animal, the mother

should give the vocal stimulus *horse* simultaneously with seeing the horse by the child.

(5) The rate at which a conditioned response is formed is dependent upon the intensity of the stimulus. Up to a certain limit, the stronger the stimulus the more rapid will be the formation of the new connection. This is particularly true if all other conditions are kept rigidly constant. As Symonds points out, a very strong conditioned stimulus retards the formation of the new connection because it probably elicits other responses which interfere with the learning. This strong stimulation calls out emotional and other reactions which are incongruous with the steady fixation of the desired response.

(6) The strength of the conditioned response bears a direct relation to the strength of the unconditioned stimulus. When the unconditioned stimulus is so weak as to produce only a very weak response, then the conditioned stimulus must also produce a similarly weak response. Conditioned responses which arise from a strong unconditioned stimulation will be likewise strong, but their strength cannot exceed that of the responses to unconditioned stimuli.

(7) Discontinuous or distributed conditioned stimulation will lead to the more rapid formation of conditioned response than continuous or concentrated stimulation. This is in harmony with present educational practises. The school child plays for a time, works at some skill activity as typewriting for another period of time, and then reads in the library in connection with some problem on which it is working. We also have examples of this procedure in the college. Many colleges require that the students appear in the classroom of a given course not oftener than every other day. It has also been determined in the study of the conditioned

response that discontinuous stimulation provides stronger conditioned responses than does continuous stimulation. This is the law of spaced or distributed learning.

(*8*) If a conditioned reflex has been established to the application of two conditioned stimuli presented simultaneously, the resulting conditioned reflex will be of greater strength than if it depended upon only one stimulus.

(*9*) If a conditioned reflex is established by any given stimulus, the presentation of this stimulus does not lead to the formation of any other conditioned reflex. This is the law of specificity of learning. It bears upon the controverted question as to whether improvement in one type of activity transfers or spreads to other types. According to this physiological law there can be no transfer of training in the true sense of the word.

(*10*) If the strength of a conditioned reflex is to be maintained over any considerable period of time it must be regularly and repeatedly stimulated with the conditioning stimulus. If this repetition of the stimulus is not carried on for a considerable period of time its strength is decreased. This is the law of forgetting. However, if a conditioned response is weakened through disuse it can be brought back to original strength by reinstatements of the stimulus and the number of repetitions will be smaller than in the original conditioning.

(*11*) If the conditioned stimulus is applied in isolation, that is, without the presence of the unconditioned stimulus, the conditioned reflex undergoes rapid diminution and finally becomes extinguished. This is the law of fatigue. As Symonds points out this principle has implications that are highly important in education. If the teacher is constantly giving instructions or commands that are not carried out by the children, these instructions will soon lose their potency. It illustrates, admirably, the ineffectiveness of nagging. It is not mere repetition that dulls or extinguishes the activity but the continual application of the conditioned stimulus without the presence of the unconditioned stimulus.

(*12*) If during or shortly before the occurrence of a conditioned reflex an additional stimulus is presented, the conditioned reflex becomes weaker. The stronger this additional or extra stimulus the greater is its inhibitory effect, but the inhibitory effect is only temporary. On repetition of the extra stimulus its inhibitory effect becomes smaller. This may be called the law of external inhibition. The facts indicate that inhibitions are learned and broken by exactly the same means that positive reactions are learned.

(*13*) Organic states and glandular secretions influence the strength of conditioned reflexes and the rate at which they may be learned. In conditioning a response it is necessary to stabilize the conditions under which the learning takes place in order to avoid disturbing the health of the individual. This holds true alike for conditions effective during the application of the stimulation and the intervals between learning.

(*14*) Conditioned reflexes can be formed in the young individual more rapidly than in the older individual.

6. How a Purposive Mechanism Is Conditioned. As was stated above a purposive mechanism is divided into two phases, the drive and the response. Both of these phases of behavior are subject to the process of conditioning. Now, the question confronting us is how the conditioning can take place. It is rather difficult to separate the two phases at this point of the discussion, but perhaps the point can be made clear. The drive of a purposive mechanism can be conditioned if it can be aroused along a new line of behavior. Or, in other words, if there is a general state of readiness to initiate a goal along one line of behavior but this general state of readiness is directed to initiate a goal along another line, the drive is conditioned. For example, suppose the teacher desires to develop in John a drive to read better literature. John wants to read literature but the teacher is not satisfied with the quality of the books which he reads. The general state of readiness is, let us say, in the line of a communication activity. The class desires to dramatize some piece of literature. John purposes to dramatize "Jiggs and Maggie," which, it will be readily seen, is not the specific type of response which the teacher desires to have consummated along the line of the communication activity. By proper stimulation and direction of John in finding better literature to dramatize he may be induced to initiate the dramatization of such a selection as "Evangeline" or "Miles Standish." If this choice is made finally as a result of an inner urge; if the teacher finds at some future time that John is reading better literature in school and in the home than he had hitherto been reading, then it may be assumed that John's drive for reading has been conditioned. The test for a conditioned drive is whether the direction of inner urge has been modified in the free and natural activity of the boy or girl. If John elects to read better literature without any external force or coercion, then his drive mechanism in this direction has been conditioned. Some or all of the various principles underlying the conditioning of a response mentioned in previous paragraphs will apply at various stages of the process of conditioning a drive.

Likewise the response of a purposive mechanism can be conditioned. A response has been conditioned when it reacts to a stimulus (substitute stimulus) for which it formerly did not have a state of readiness to react. The vocal mechanism of the young child is in a state of readiness to utter words when the mother utters them but it is not in a state of readiness to utter them when they are written or printed in the form of symbols. But if the mother or the teacher presents the written symbols simultaneously with vocal stimuli (pronunciation of the words) the child soon learns to pronounce the words and thereby learns to read. Reading and writing are good examples of conditioned responses. They both arise out of the fact that there are responses which are in a state of readiness to be elicited along these lines of behavior and they become attached to new or substitute stimuli. The conditions underlying the conditioning of a response discussed in previous paragraphs will apply at various stages of the process of conditioning illustrated here.

7. The Conditioned Mechanism and the Broader Aspects of Education. In Chapters IX and X and in Part III of the text will be given a discussion of the function of the conditioned mechanism in the broader aspects of education. But it will be well to consider here very briefly some of the possibilities of its application. Burnham[7] makes the following statement in this connection: "The study of the conditioned reflexes throws light on many things in human behavior, not only on the obvious phenomena of habit and association, but on many other things of ordinary everyday life, for example, the peculiar behavior of many children, the tricks and mannerisms and forms of misbehavior of the normal as well as the hysterias and defects of the abnormal, the bizarre acts of adolescents and adults. The peculiar disorders and neuroses that often occur, the eccentric character of many crimes, as well as many ordinary forms of behavior." At the present stage of experimentation with the conditioned response it is impossible to state whether all forms of behavior-modification are of the type of the conditioned reflex. Some of the leading investigators in the field to-day are convinced that they are. According to Morgulis [8] the results of Pavlov's experiment indicate that "all psychic activity is nothing else than a complex nervous function which is fulfilled by two mechanisms, identical with the first and second portions of the reflex arc. One serves to break up the complexity of the outside factors into their ultimate elements; the other serves to bring various agents of the outside world into temporary association with fundamental organic functions." Watson [9] indicates that the whole personality of the individual is but the outgrowth and the sum total of the habits or conditioned responses he forms. "I define personality as the sum of activities that can be discovered by actual observation of behavior over a long enough time to give reliable information. In other words, personality is but the end-product of our habit systems." And it has already been stated that Watson holds that thinking goes on in terms of the implicit reactions of vocal mechanisms, manual mechanisms, and visceral mechanisms.

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[7] Burnham, W. H. "Mental Hygiene and the Conditioned Response." Ped. Sem., 1917, 24, 462. By permission of the editor.

It has been suggested by Mateer [10] that the conditioned response technique would provide a good form of intelligence test, and that eventually it must replace the present forms of intelligence tests. In other words the limit and rate at which an individual can adapt himself to a new situation may be measured in terms of his conditioned responses.

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[8] Morgulis, S. "Pavlov's Theory of the Function of the Nervous System." J. of An. Beh., 1914, 4, 364.

[9] Watson, J. B. Behaviorism, 216ff., 1926. By permission of W. W. Norton and Co.

[10] Mateer, F. Child Behavior, 86ff., 1918.

Humphrey [11] is of the opinion that the conditioned responses will account for most of the behavior of the normal and abnormal individuals described so extensively in the Freudian literature. Repressed wishes, complexes of various kinds, and other phenomena of the so-called unconscious mind are mere conditioned responses which have been set up under conditions which were not conducive to wholesome behavior.

Thus the application of the conditioned response principle is possibly quite broad. Through its discovery certain new factors in connection with learning have been determined. Some of the older theories have been more thoroughly established by it. Others have been discarded because they were not in harmony with it. Cason [12] critically evaluates some 175 studies, experimental and theoretical, in America and abroad on the conditioned response, and finally comes to this conclusion: "After reading the literature on the conditioned response one comes away with the feeling that it is the method by which habits are formed. But after considering the complexity of mental life and the numerous factors which must contribute to our acquired activities, the conditioned reflex seems to be too simple an explanation to cover the whole field. It is probable that in attempting to clarify the issue involved, several writers have placed too much emphasis on certain concrete phases such as the stimulus-response. There are many other factors to be considered and many other problems to be solved. And yet, when an association is formed between salivary secretion in a dog and the sound of a bell, neither the law of exercise, the law of effect, nor 'trial and error' is adequate to give an explanation. The conditioned reflex principle itself has a definiteness and plausibility which the other theories do not possess."

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[11] Humphrey, G. In a series of articles in J. of Abnor. Psychol. and Soc. Psychol. Vols. 14, 15, 17.

[12] Cason, H. "The Conditioned Reflex or Conditioned Response as a Common Activity of Living Organisms." Psychol. Bull., 1925, 22, 464. By permission of the Psychological Review Co.

8. **Summary.** There are two phases of a purposive mechanism, the drive and the response. They are functionally interrelated and operate more or less as a unit, but for convenience of discussion of learning problems it is necessary to consider them separately. They are in a state of readiness to function along certain lines of activity. The drives are in a state of readiness to initiate goals of attainment along the following lines: (1) Excursion, (2) Communication, (3) Construction, (4) Play, and (5) Activities of skill. The initiation may be in the initiation of the goal at the outset, in the initiation of the means to accomplish the goal, or in the initiation of improvement in the means of accomplishment. The responses are in a state of readiness to be elicited along certain lines of behavior. These lines of behavior are the same as those listed for the drive mechanism, namely, excursion, communication, construction, play, and skill. Within these lines of behavior the responses may function in any one of several different ways, namely, the evaluation and choice of goals which have been initiated by the drives; the evaluation, choice, and execution of means; and the evaluation, choice and consummation of improvement.

A purposive mechanism can be conditioned or modified. A mechanism which is in a state of readiness to function along one line of behavior can be brought to a state of readiness to react along another line of activity with the proper conditions of stimulation and direction. Certain conditions of the organs of connection, especially the modifiability of synaptic junctions, make this conditioning possible.

Various stimulus-response mechanisms have been conditioned experimentally. The most noted of these is the salivary mechanism of the dog which has been conditioned by Pavlov. He found that the salivary mechanism, which is innately in a state of readiness to secrete saliva when food has been placed in the mouth, can be conditioned so as to assume a state of readiness to secrete saliva when stimulated through the avenues of auditory, visual, and cutaneous stimulation. Cason was able to condition the eye-wink and the pupillary mechanisms. The eye-wink mechanism will react innately to moving objects near the eye. He was able to call out this reaction by the application of a sound or an electric shock. The pupillary mechanism will react innately to varying degrees of luminosity of light, contracting as the luminosity increases and dilating as it decreases. Cason succeeded in conditioning this mechanism so that it would react to sound and to electric shock. Watson studied the emotion mechanisms and found that they could be conditioned. Fear, which can be called out in the young infant only by a loud noise or loss of support, could be modified so as to be elicited by many other stimuli such as the presence of a furry animal. He also has shown that all language responses are made possible by the conditioning of innate manual and vocal reactions. Thinking is made possible by these conditioned language responses.

A drive can be conditioned when it can be aroused along a hitherto new line of behavior. If a drive is in a state of readiness to initiate goals of attainment along one line of behavior but this general state of readiness is directed to initiate goals along another line, the drive is conditioned in this respect. In the same manner a response can be conditioned. A response has been conditioned when it reacts to a stimulating condition for which it formerly lacked a state of readiness to react.

The discovery of the conditioned response principle throws considerable light on many problems in education, according to such writers as Burnham, Watson, Mateer, Humphrey, and Cason. It applies in the field of abnormal as well as normal behavior. It may be applied in studying the problem of learning, personality, intelligence testing, and social maladjustment.

CHAPTER IX

THE LAWS OF CHANGE IN PURPOSIVE BEHAVIOR: THE LAW OF DRIVE

1. Two Fundamental Laws of Change in Purposive Behavior. The most important problem in education is how to guide the growth of children so they can meet their daily problems adequately and enjoy the richness and fulness of life to the limits of their respective abilities. Psychologically speaking, this growth takes place in the form of conditioned behavior, or learning. As has been indicated before, the individual is born into the world with certain sensory, motor, neural, and emotional equipment. Certain units of behavior are inherited. The individual's education begins at birth and continues throughout life in the form of ever changing modes of behavior. He forms new habits, develops new skills and attitudes, and sets up new goals of attainment. The previous chapters have been concerned with determining the physical basis of the inherited forms of behavior and pointing out some of the factors involved in the change of behavior. It is the aim of this and the following chapter to restate these physiological facts in terms of laws or principles for the purpose of guiding the teacher in dealing with practical situations in child growth. So, in the following pages the discussion will be devoted to two fundamental laws of purposive learning, the Law of Drive and the Law of Response.

2. The Law of Drive. The first law of purposive learning is the *Law of Drive.* Until recent years at least, the value of this phase of the learning process has been underestimated or overlooked entirely. As we survey the literature concerning the work of the traditional school or observe this type of school in operation we are convinced that its function is to drill the child or put it through series of exercises until certain habits are fixated. It is assumed that continual repetition is the only factor involved in the formation of desirable modes of behavior. Little account is taken of the dynamic nature of the child and even less consideration is given to the question of how this dynamic force can be made use of in carrying on the educational program. That we learn to do by doing is a truism that no one will gainsay, but certainly this is not all there is in learning. As Barton [1] states, we might as well turn the statement around and say that "We do because we have learned." He points out that the change in behavior is only an indicator of the change that has taken place in the equipment involved in the response. The change which we observe is likely some changed aspect of the response mechanism. He, therefore, has difficulty in seeing how the fact of use gets ahead of the change which must take place in the mechanism.

To repeat, the first fundamental law of purposive learning is the *Law of Drive.* Thorndike [2] calls it the Law of Readiness and states it as follows: "When any conduction unit is in readiness to conduct, for it to do so is satisfying. When any conduction unit is not in readiness to conduct, for it to conduct is annoying. When any conduction unit is in readiness to conduct, for it *not* to do so is annoying." He defines a satisfying state of affairs as one in which the organism does nothing to avoid it and may frequently do things to prolong or renew it. Or in other words it is a situation to which the organism reacts positively. And he defines an annoying state of affairs as one in which the organism does nothing to preserve it, and often does things to minimize it or get rid of it. It is a situation to which the organism reacts negatively.

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[1] Barton, J. W. "Repetition vs. Other Factors in Learning." Ped. Sem., 1922, 29, 283-287. By permission of the editor.

[2] Thorndike, E. L. Educational Psychology, Vol. II, 1f., 1913. By permission of the author.

The fundamental idea put forth by Thorndike in the above lines is the idea to be brought before the reader here. However, it is well to substitute the term *drive* for Thorndike's *readiness,* since the discussion of the dynamics of behavior thus far has been in terms of drive. Drive is a dynamic force which frequently causes the organism to go on a hunt for stimulation which in turn will bring about the consummatory response. So we shall call this principle the Law of Drive and shall state it as follows: *In order to condition a stimulus-response mechanism it must first of all be in a state of readiness to initiate goals of achievement along a certain line of behavior.*

The thesis of this chapter is that learning which takes place as the result of an internal urge or drive is the most desirable kind from every standpoint, whether it be from that of the teacher or the child. Learning brought about under this condition results in a better relation between the teacher and the child; eliminates a large amount of the so-called discipline problems; is frequently, though not always, the most economical from the standpoint of time and energy required to reach a certain degree of proficiency; is certainly more economical when we consider the permanent and lasting effects of learning; can be brought more closely in touch with the vital interests and activities of boys and girls; and brings greater returns, it is believed, from the standpoint of the broader aspects of education, namely, the development of good citizenship, desirable social attitudes, esthetic appreciation, and proper personal habits. Later in this chapter, the results of some experimental studies will be presented in support of this thesis.

3. **Experimental Studies of the Law of Drive.** The number of substantial experiments that have been worked out on the drive in behavior is very limited. There are at least two reasons for this limitation. First, the emphasis upon this phase of education, as was indicated above, has been observed only during recent years. Second, it is very difficult to plan an experiment in which the effect of the drive factor can be accurately measured. Despite the limitation of experiments of this type, however, a number of valuable studies have been made and some of the representative ones will be reviewed here.

(1) Mulhall's Study of Effect of the Learner's Attitude. A few experiments have been worked out to determine the effect of the attitude of the learner upon, first, the amount that can be learned, and second, the extent to which that which has been learned can be retained and recalled at some time subsequent to the learning. In the pioneer studies on memory by Meumann,[3] we find the suggestion that the attitude of the learner or his 'will to learn' has a very important influence on the outcomes of learning activities. One of the earlier studies bearing on this topic is that of Mulhall.[4] It was the purpose of one phase of her experiment to

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[3] Meumann, E. The Psychology of Learning, 303, 1913..

[4] Mulhall, E. F. "Experimental Studies in Recall and Recognition." Amer. J. Psychol., 1915, 26, 217-228.

ascertain the effect of the learner's *determination* to recognize or recall what was learned versus mere learning without any attempt to recognize or recall the material at some future time. Two learning activities were engaged in by the subjects, namely, memorizing syllables and memorizing the names of photographs.

The results of this study are summarized in Table I. They show that from the standpoint of either recall or recognition, two means of measuring memory, the advantage is in favor of learning with a purpose to remember. The author points out that the factor of purposing to remember has a greater advantage for material which is rich in associations (the names of photographs) than material which calls for mere rote memory (the syllables).

TABLE I

Relative Effects of Purposive Learning and Non-Purposive Learning as Measured in Terms of Amount Recalled and Recognition. (By Mulhall.)

Syllables	
Ratio of Purposive Recall to Non-Purposive Recall..........	100 to 81.3
Ratio of Purposive Recognition to Non-Purposive Recognition	100 to 97.5
Photographs and Names	
Ratio of Purposive Recall to Non-Purposive Recall..........	100 to 57.2
Ratio of Purposive Recognition to Non-Purposive Recognition	100 to 99.7

(2) *Peterson's Study of Effect of the Learner's Attitude.* Peterson [5] performed a similar experiment in which the activity was learning a list of words. Two groups of students were given the material to be learned under two conditions. Under one condition the students assumed a mere passive attitude during the learning process, not knowing that they

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[5] Peterson, J. "The Effect of Attitude on Immediate and Delayed Reproduction." J. Educ. Psychol., 1916, 7, 523-532.

would be called upon to reproduce them. The experimenter tested the students to determine the effect of purposing in both immediate and delayed reproduction. Table II shows the result of this study. Purposive learning was most effective for both immediate recall and delayed recall.

TABLE II

RELATIVE EFFECT OF PURPOSIVE LEARNING AND NON-PURPOSIVE LEARNING AS MEASURED IN TERMS OF AMOUNT OF IMMEDIATE RECALL AND DELAYED RECALL. (By Peterson.)

Group I

Immediate Reproduction with Purpose was 14.8% better than Non-Purposive

Delayed Reproduction with Purpose was 48.4% better than Non-Purposive

Group II

Immediate Reproduction with Purpose was 30.0% better than Non-Purposive

Delayed Reproduction with Purpose was 51.0% better than Non-Purposive

(3) Book and Norvell's Study of Effect of Purposive Learning. Book and Norvell[6] have worked out a rather elaborate experiment dealing with the effects of the "will to learn". It was their aim to determine the effect or purposive effect and interest in improvement upon the rate and limits of learning. Several types of activity were used. One was a purely muscular feat, that of making the letter "a" as rapidly and accurately as possible. Another was learning to locate and cross out certain letters in a list of Spanish words. A third was the fixation of certain psychophysical reactions. A fourth was learning to multiply a two-place number by another two-place number.

The methods of stimulating the experimental group involved permitting the students to keep their own scores and urging them to raise their scores as much as possible throughout the duration of the experiment by utilizing any device that might aid in their improvement and to avoid any practises which might retard their progress. The control groups were given instruction to do their best on every test but they were not to pay any attention to their scores from day to day and were to banish all thought of and desire for improvement.

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[6] Book, W. F. and Norvell, L. "The Will to Learn: An Experimental Study of Incentive in Learning." Ped. Sem., 1922, 29, 305-362.

These authors summarize the results of their experiment somewhat as follows: The experimental or purposive-groups made more improvement with a given amount of practise than did the control or non-purposive groups. Likewise it held true for the groups as a whole as well as for individuals. The superiority expressed itself in the form of greater accuracy and higher scores.

The final conclusion which may be drawn from these studies is that when learning is purposive on the part of the learner results are obtained which are superior to those secured when the factor of purpose is absent. Most of the activities engaged in in these experiments were quite simple and the incentives were not as strong as would be found in activities in which the final goals were more important. In other words, there is nothing for the subject to be enthused about if he does make a high score in memorizing nonsense syllables, in crossing out certain letters in printed material, or in learning the names corresponding to a set of photographs. But these experimenters have shown that purposive behavior is superior in even these uninteresting and uneventful activities. And if this holds true for this kind of learning activity, may we not expect much greater results in the more vital situations of boys and girls?

(4) Judd's Study of Effect of Knowledge of Results. Another way in which a drive may be created for learning is to keep the learner informed of the progress which he is making. The oft-repeated expression "Nothing succeeds like success" is no doubt true in the schoolroom as it is elsewhere. Several investigators have undertaken to measure experimentally the results of this factor in stimulating school work. It will be recalled that a part of the experiment by Book and Norvell in the previous section of this chapter dealt with this type of stimulation. The fact that the experimental group of students knew the results of their work, no doubt, was a factor which accounted in part for the superiority of their learning.

One of the earlier studies of this nature was made by Judd.[7] In this experiment the subject was required to place a dot behind a screen at a point which would appear to him to be on the extension of a line visible in front of the screen. The errors were measured in terms of the distance at which the dot in each trial was placed above or below the true extension of the line. No information was given the subject as to his progress or improvement in accuracy. Judd pointed out that in this particular function mere practise brought little if any change in accuracy. The subject continued to make maladaptive responses and there was no generalization or specialization in the movements. This experiment was repeated by Spencer.[8] The only difference in the procedure was a variation in the method of measuring of the errors. Spencer found there was some improvement,

[7] Judd, C. H. "Practice Without Knowledge of Results." Psychol. Mono., 1905-6, 7, 185-198.

[8] Spencer, L. T. "The Effects of Practice Without Knowledge of Results." Amer. J. Psychol., 1923, 34, 107-111.

but as one observes the tables of results which he obtained one finds that the improvement was quite small.

(5) Arps' Study of Effect of Knowledge of Results. Arps [9] attempted to find the effect of knowledge of results upon the amount and rate of work done upon the ergograph. In one set of experiments the subjects knew the results of their efforts (known series), while in the other they knew nothing or were only partially informed of the output of their work (unknown series). There was a general superiority of the results of the known series over those of the unknown series. This superiority of the known series ranged from 5% to 35%. It was found to be present when the quantity of work done was measured in terms of the absolute work done and also the rate of work. In an extension of this study under similar conditions Arps [10] again found that "within the limits operative for the present study both the absolute amount of work and the rate of work done under conditions of knowledge of results exceed that done under conditions of ignorance of results."

(6) Ross' Study of Effect of Knowledge of Results. A study of similar nature was carried on recently by Ross,[11] having for its purpose the determination of the relation between knowledge of progress and achievement in a motor function. The process involved was a simple act of muscular skill, namely, making groups of four vertical lines and crossing them with a fifth, after the order of the device used in tabulating sometimes called tallying. The group of

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[9] Arps, G. F. "A Preliminary Report on 'Work with Knowledge of Results Versus Work without Knowledge of Results.'" Psychol. Rev., 1917, 24, 449-455.

[10] Arps, G. F. "Work with Knowledge of Results Versus Work Without Knowledge of Results." Psychol. Mono., 1920, 28, p. 41.

[11] Ross, C. C. "An Experiment in Motivation." J. Educ. Psychol., 1927, 18, 337-346.

students were divided into three sections of equal ability in tallying, the division being made on the basis of an initial test. To one of the sections, full information of progress was given from day to day, to another only partial information was given, and to the other no information of progress was given. The results of the study show that the section with full information improved on the average of 6.2 per cent more than the section with only partial information, while the section with partial information improved on the average 8.0 per cent more than the section with no information.

The results of practically all of the studies bearing on the influence of knowledge of progress in learning are positive.[12] That is, a better quality and a greater quantity of work was done, or learning took place at a more rapid rate when the subject was constantly informed of the results he was getting from his efforts. Again, the activities used in these studies do not as a rule come within the vital activities of boys and girls. But experimenters established the point despite this fact. Even greater results should be expected if more vital activities were used. One general conclusion could be drawn for the teacher from these studies, namely, that in all school activities, the results of which can be measured with any degree of accuracy, the outcomes should be kept constantly before the child. His attention should be directed to those phases where improvements could be made. Daily, weekly, or monthly records should be kept of work done in spelling, handwriting, reading, art, music, manual training, home economics, and in any other school work which permits of measurement. Likewise the child should be informed of his successes and failures in the written or oral reports of problems solved, or of any other exercises in which he has engaged, where such reports are expected by teachers. The results of the above studies indicate that he is justly entitled to this information.

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[12] One study in which the results were somewhat negative is that of Colburn, Collins, and Myers, "Knowing the Speed of Performance Versus Not Knowing the Speed." School and Soc., 1918, 8, 597-600.

(7) The Effect of Encouragement and Discouragement. In order to stimulate children in their work, teachers frequently use methods which are directly opposed to each other. Some teachers use such incentives as encouragement, praise and commendation, while others use just the opposites, as censure, threats, and ridicule. Until recently, little has been known as to the relative efficacy of these two groups of incentives, each teacher using the incentive which best fitted into her general attitude and disposition. But within the last few years, several experiments on this problem have been worked out.

Hurlock,[13] in a summary of the evidence on this subject, points out that from experiments on animals learning takes place more rapidly when the animal is rewarded for its efforts than when punished. She also shows that printers who had been at their posts for many years greatly increased their rate of work when a bonus was offered for superior work.

Laird [14] submitted a questionnaire to a group of university freshmen and sophomores to determine the relative effect of praise and blame on their high school and university work. Briggs [15] followed the same procedure with graduate students and compared the results of the two studies. As

[13] Hurlock, E. B. "The Value of Praise and Reproof as Incentives for Children." Archives of Psychology, No. 71, July, 1924, pp. 78.

[14] Laird, D. A. "How the High School Student Responds to Different Incentives to Work." Ped. Sem., 1923, 30, 358-365, 366-370.

[15] Briggs, T. H. "Praise and Censure as Incentives." School and Soc., 1927, 26, 596-598.

the latter points out, there is some limitation to the accuracy of such reports. However, since the groups were quite large it is possible that many of the inaccuracies of individual cases are somewhat offset. It is evident from both studies that encouragement, praise, and commendation give better results than censure, ridicule, sarcasm and punishment.

(8) Wilson's Study of Effect of Interest upon Effort. As stated in Chapter VI, Wilson [16] made a study to determine the relation of interest of college students to effort expended. Interest was expressed in terms of subjects selected for study in an institution where considerable freedom was permitted in the choice of a course of study. The expenditure of effort was measured in terms of achievement indicated by teachers' marks. Some 750 students in a liberal arts college were divided into groups according to the departments in which they were pursuing their major sequence. The selection of courses and the achievement in these courses were analyzed and correlated. It was found that the curve for the selection of courses was high in the vicinity of the major department and closely related courses and low in the other courses. Likewise the achievement was high in the major and closely related subjects and lower in the other subjects.

In another study by the same author [17] it was found that freshman women in college, who are pledged to social sororities make better grades than those who are not pledged. This is presumably due to the fact that among other factors the pledges have a greater drive for succeeding in the social function of making high marks than have the nonsorority students. The outcome of these two studies is that the student puts forth his best efforts when he has, as Dewey [18] has said, "identified himself with, or has found himself in, a certain course of action." Whatever "objects and forms of skill are involved in the successful prosecution of that course" become a part of the student.

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[16] Wilson, M. O. "Interests of College Students." Amer. J. Psychol., 1927, 38, pp. 409-417.

[17] Wilson, M. O. "Intelligence and Achievement of Freshman Women." School and Soc., 1925, 21, 693-694.

(9) Collings' Study of Effect of Child-Purposing. All of the methods of securing a drive for school work outlined in the previous pages have their advantages perhaps in different kinds of activities. Certainly the attitude of the learner is an important factor. A desire to learn is fundamental to effective learning. Likewise more satisfactory results will be obtained if the child can keep before him a record of his progress. There may be times when incentives consisting of some kind of reward will bring the desired effect. Without doubt praising is better than scolding in most cases. Better working relationships exist between teacher and child and possibly the results of learning are more lasting when censure and biting sarcasm are absent. But all of these methods, while good as far as they go, are narrow and limited in their scope. A method of setting up a drive in children should touch every vital activity in which the child participates. It should be felt in the schoolroom, on the playground, in the home, and in the community in which the child lives.

It is the contention of the present writers, therefore, that the most effective means of securing this broader condition of drive is by utilizing the purposeful activities of the child. This purposing should be present in all of the phases of learning behavior. The child should have a part in the initiation and choice of problems to be solved and in planning the means of solving them. Certainly, he rather than the teacher should execute the means because, as has been pointed out and as will be stressed in the next chapter the learning takes place only through the responses that the individual makes. Further, the child should not only be given ample opportunity but should be encouraged to evaluate critically the results of his plans and the execution of them. Lastly, he should be given an opportunity to express the new drives that have arisen out of the successes and failures of solving a given problem by setting up new problems. This is education in the true sense of the word. Each purposeful activity leads on to further activity. Each experience leads ever to new and broader experiences.

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[18] Dewey, J. Interest and Effort and Education, p. 7, 1913.

As is pointed out in another publication by Collings,[19] "This interpretation of education contrasts sharply with the conventional interpretation. Education is quite generally interpreted as the assimilation and reproduction of subject-matter isolated from the purposes of boys and girls. It considers the 'mind as a graveyard, spacious and receptive. But data, events, knowledge of all kinds are so often dead matter ready for interment; the lesson the burial rite, a tedious ordeal, but very necessary in respectable places; the teacher, the only live entity in the analysis, a combination of divine and undertaker; the examination, a sort of resurrection morning, where, true to form, few resurrect.' In this sense, education is assimilation in study and reproduction on examination or class recitation of facts, as, for example, geographical facts, historical facts, grammatical facts, and the like. It is a study of products. The child is thus considered 'educated' if it has covered the prescribed ground within the specified time. Education as absorption has nothing in common with education as growing. One is active, the other is passive; one is expression, the other is repression; one is doing, the other is pouring in; one is activity, the other is reproduction of facts; one is purposeful, the other is purposeless; one proceeds from an inner drive, the other from an outer drive; one is creative, the other is a study of ready-made products; one is guidance, the other is dictation; one measures changes in conduct, the other measures facts reproduced; one encourages thinking, the other encourages memorizing; one makes subject-matter a means, the other makes it an end; one considers inborn tendencies the foundation of growth, the other considers them a nuisance; one is life, the other is preparation for life; one maximizes initiative, self-reliance, cooperation, the other minimizes these traits—in short, one makes for active, intelligent, industrious and upright boys and girls by affording them guidance in the pursuit of their own purposes (creative activity), the other makes for inactive, unintelligent, unindustrious and dishonest boys and girls by prescribing certain facts to be assimilated and reproduced within a special time (study of ready-made products)."

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[19] Collings, E. Creative Supervision, p. 57f., 1925.

a. An Experiment in Purposive Behavior. Much has been written on the philosophy of education through purposive behavior by Dewey, Kilpatrick, and others, but the experimental work on the effects of the broader type of purposive behavior under discussion is quite limited. A rather extensive study has been carried out by Collings [20] and the results will be briefly summarized here.

b. Purpose of the Experiment. This experiment was carried on in the rural schools of southwest Missouri. Its main purpose was to determine if the country school curriculum could be selected from the purposive activity of boys and girls in real life. It was assumed in this experiment that one method of motivating or securing a drive for the school work of boys and girls in the rural districts was by taking advantage of their natural bents and interests. This method was to be compared with the traditional method of having children work with a curriculum and a method of instruction where all purposing and planning was done by the State Board of Education and the teacher and presented to the children in the form of a set curriculum for each grade and each subject. In this type of educational program, all that was left for the pupil to do was mere memorizing of facts outlined in the State Course of Study. According to the laws of learning outlined in the beginning of this chapter, this latter type of program was just a half-program. That is, the boys and girls had opportunity for the Law of Response to function to some extent but there was little or no opportunity left for the Law of Drive. Adequate provision for developing initiative, resourcefulness, and other dynamic qualities in the children was lacking. It was the purpose of this experiment to provide opportunity for expressing these dynamic qualities and compare the results with those of the traditional school.

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[20] Collings, E. An Experiment with a Project Curriculum, 1923. Use of tables and summaries below by permission of The Macmillan Co.

c. Method of the Experiment. This experiment extended over a period of four years. Three typical rural schools were used, one experimental school and two control schools. The various aspects of the three schools were as nearly the same as could possibly be secured. They were equated with respect to the following: (1) Length of school term, course of study (up to the time the experiment began), library facilities, school equipment, and supervision; (2) number of teachers and their age, tenure, teaching experience, salary, and education; (3) community conveniences and social and economic status of the districts; (4) nationality of parents and their wealth, education, attitudes toward the school and education, and conduct in the home and community, in so far as these could be determined; and (5) abilities of children in their school achievements, attitudes toward the school and education, and conduct in life outside of the school. In the experimental school there were forty-one children; in one control school there were twenty-nine children, and in the other there were thirty-one children enrolled. In order to establish the equivalence of the schools with respect to the abilities of the children, standardized tests were administered to them before the experiment began. The results of these measurements are given in Table III. For the two control schools the results are combined and the medians taken so that they may be compared with those of the experimental school.

TABLE III

Comparison of Median Scores in Reading, Handwriting, Spelling, Subtraction, Multiplication, and Division for All Grades of the Experimental School and Control Schools. (By Collings.)

Reading
(Thorndike Scale Alpha)

Grades	*III*	*IV*	*V*	*VI*	*VII*	*VIII*
Experimental School	2.28	3.48	5.96	5.98	6.11	6.78
Control Schools	2.78	3.12	6.11	5.14	6.17	8.98

Handwriting
(Thorndike—Quality)

Grades	*III*	*IV*	*V*	*VI*	*VII*	*VIII*
Experimental School	4.0	5.0	6.0	6.0	8.0	9.0
Control Schools	4.0	6.0	5.0	7.0	8.0	11.0

TABLE III—*Continued*

Spelling
(Ayres)

Grades	*III*	*IV*	*V*	*VI*	*VII*	*VIII*
Experimental School	23.0	43.0	59.0	42.0	43.0	62.0
Control Schools	27.0	44.0	58.0	43.0	42.0	41.0

Addition
(Courtis—Speed—Accuracy 100)

Grades	*III*	*IV*	*V*	*VI*	*VII*	*VIII*
Experimental School	1.0	2.0	4.0	5.0	5.0	5.0
Control Schools	1.0	3.0	5.0	5.0	6.0	6.0

Subtraction
(Courtis—Speed—Accuracy 100)

Grades	*III*	*IV*	*V*	*VI*	*VII*	*VIII*
Experimental School	2.0	4.0	5.0	6.0	6.0	7.0
Control Schools	1.0	5.0	5.0	6.0	7.0	8.0

Multiplication
(Courtis—Speed—Accuracy 100)

Grades	*III*	*IV*	*V*	*VI*	*VII*	*VIII*
Experimental School	3.0	3.0	4.0	6.0	6.0	7.0
Control Schools	3.0	4.0	5.0	6.0	5.0	7.0

Division
(Courtis—Speed—Accuracy 100)

Grades	*III*	*IV*	*V*	*VI*	*VII*	*VIII*
Experimental School	1.0	2.0	2.0	5.0	5.0	7.0
Control Schools	1.0	3.0	3.0	5.0	6.0	7.0

d. Measuring Outcomes of the Experiment. Several attempts were made to measure the outcomes of the experiment for the four-year period. All functions for which standardized tests were conveniently available were measured in order to determine the relative achievement of the Experimental School and the Control Schools. These functions were as follows: Penmanship quality, written composition, spelling accuracy, American history information, geographical information, reading comprehension, addition accuracy, multiplication accuracy, subtraction accuracy, and division accuracy.

Next, an attempt was made to measure relative improvement in attitudes of the children of the Experimental School and the Control Schools toward the school and education over the four-year period. These attitudes were expressed as follows: Percentage of pupils enumerated in district enrolled in school; percentage of pupils enrolled attending every day; percentage of pupils tardy eight or more times during the year; percentage of pupils playing truant one or more times during the year; percentage of pupils suffering corporal punishment during the year; percentage of pupils enrolling that remained throughout the year; percentage of pupils enrolled in eighth grade graduating during the year, and percentage of eighth grade pupils entering high school.

Then, measurement was made of changes in twelve ordinary phases of conduct in the life of the children outside of the school. These changes were as follows: Percentage of children in the district reading twelve or more story books at home during the school year, covering such subjects as travel, history, biography, and adventure; percentage of pupils reading one or more daily newspapers in the homes of the district; percentage of pupils studying instrumental music (piano, organ, violin, etc.) in the homes of the district; percentage of pupils participating in such activities as community fair, community play day, and celebration of holidays; percentage of pupils engaging in two or more social parties, such as story, music, game, and birthday, in the home during the year; percentage of pupils engaged in one or more country clubs, as pig, chicken, corn, garden, potato, during the school vacation; percentage of pupils reading six or more story books such as travel, fiction, biography, and adventure, at home during the school vacation; percentage of pupils reading one or more such magazines as *Little Folks' Magazine, St. Nicholas, American Boy, Youth's Companion, Literary Digest,* and *Saturday Evening Post;* percentage of pupils practising in the home such health habits as brushing the teeth daily, putting the handkerchief over the nose when sneezing and the mouth when coughing, washing the hands before eating each meal, sleeping with a bedroom window up, eating fruits and vegetables daily, bathing the body at least weekly, eating meals regularly, and sleeping ten hours each night; percentage of pupils stricken during the year with one or more of the common children's diseases as colds, mumps, typhoid, pneumonia, and measles; percentage of pupils of the district participating in one or more games at home during the year, such as basketball, town ball, handball, volley ball, baseball, tennis and croquet; and percentage of pupils saving ten or more dollars from earnings made during the school vacation.

Further, it was attempted to determine the relative influence the two methods of instruction had upon the conduct of the parents of the children. That is, what was the relative extent to which the effects of the two methods permeated the community and wrought changes in conduct and attitudes of the patrons? There were fourteen phases of conduct of the parents upon which changes were observed: Percentage of parents reading one or more farm journals; percentage of parents reading six or more books of travel, fiction, and adventure during the year; percentage of parents reading one or more daily newspapers; percentage of parents attending regularly the night community meetings; percentage of parents participating in one or more of the children's community activities, such as community fair, community play day, and community celebration of holidays; percentage of farmers of district testing seed corn before planting; percentage of farmers testing milk of dairy cows for butter fat; percentage of farmers changing from mixed type of seed corn to pure type; percentage of farmers changing from mixed type of dairy cows to thoroughbred type; percentage of farmers reading six or more farm bulletins, as Seed Corn Testing, Dairying, Cook, etc.; percentage of farmers reading one or more magazines as *Saturday Evening Post, Literary Digest, Country Gentleman;* percentage of farmers reading one or more of the county newspapers; and percentage of parents stricken with one or more contagious diseases, as typhoid, pneumonia, etc., during the year.

Lastly, the relative influence of the two methods of instruction was measured in terms of changes in certain community conveniences and cultural devices aside from the use of newspapers and magazines, as follows: Percentage of homes having a library of seventy-five or more books; percentage of homes having screens on doors and windows; percentage of homes with lawns, flowers, trees, vines; percentage of homes equipped with such conveniences as fly-traps, fly swatter, canning equipment, bookcases, library table, paper rack, ironing board, washing bench, window ventilators, cooking aprons; percentage of homes having playground equipment for one or more games as basketball, tennis, tether ball, volley ball, and croquet; percentage of homes having one or more musical instruments, as victrola, piano, organ, or violin.

4. **Outcomes of the Experiment.** The outcomes of this experiment in purposive behavior at the end of the four-year period in terms of the relation of achievement of the Experimental School to that of the Control Schools and National Standards may be summarized as follows:

1. The mean achievement of the Experimental School in the common facts of skill when expressed in terms of the achievement of the Control Schools was 138.1%.
2. The mean achievement of the Experimental School in the common facts and skills when expressed in terms of the achievement represented by the National Standard was 110.8%.
3. The improvement of the children of the Experimental School in eight ordinary attitudes toward the school and education ranged from 25.5% to 93.1%, whereas improvement of the children in the Control Schools in the same attitudes ranged from 2.0% to 15.0%.
4. The improvement of the children in the Experimental School in twelve ordinary phases of conduct in life outside of the school ranged from 35.0% to 100.0%, whereas the improvement of the children of the Control Schools in the same phases of conduct ranged from no improvement to 25.0%.
5. The improvement of the parents of the Experimental School District in certain ordinary attitudes toward the school and education ranged from 16.0% to 91.0%, whereas the improvement of the parents of the Control School Districts in the same attitudes ranged from no improvement to 30.0%.
6. The improvement of the parents of the Experimental School District in certain ordinary phases of conduct in the home and community ranged from 20.0% to 96.0%, whereas the improvement of the parents of the Control School Districts ranged from no improvement to 25.0%.

7. The improvement in certain ordinary community conveniences and cultural devices aside from the use of newspapers and magazines in the homes of the Experimental School District ranged from 34.5% to 94.0%, whereas the improvement in the same conveniences and devices for the Control Schools ranged from 3.3% to 24.8%.

In bringing the discussion of this experiment to a close, it should be kept in mind that the results were obtained from only one experiment carried out over a four-year period. Only three schools were used and the number of school children involved totaled only 101. These schools were rural schools and not urban schools. Although an attempt was made to keep all phases of the experiment on an objective basis, yet several subjective factors may have crept in. But, it is believed that the principles borne out by these results are representative of what would be accomplished if the scope of the problem had been extended indefinitely and various types of schools had been included.

5. The Nature of Purposive Learning. The nature of purposive learning is not definitely known. Why learning which is purposive should progress more rapidly and result in greater permanency than that which is not purposive is difficult to determine. Little experimental work has been carried out but considerable theorizing has been done on this problem. A few of these discussions will be considered briefly here.

(1) Peterson's Theory of Effect of Completeness of Response. One of the most satisfactory hypotheses is that of Peterson.[21] He maintains that learning of any kind involves a very intricate interacting of a multitude of stimulus-re-

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[21] Peterson, J. "Completeness of Response as an Explanation Principle in Learning." Psychol. Rev., 1916, 23, 153-162.

sponse mechanisms. In order for learning to be effective the responses must be complete responses. As Perrin and Klein [22] state, in commenting upon this viewpoint, the interaction of these mechanisms makes it necessary that we account for their mutual influence on the total problem situation. The theory accounts for the integrative nature of learning and for the elimination of incorrect responses and fixation of correct responses. Whether the responses are finally fixated or rejected is dependent upon their relation to the dominating consummatory response. If they tend to further progress toward the final goal they are fixated; if they hinder or retard this progress they are eliminated. Peterson has done some experimental work which tends to support this concept of the nature of learning.[23]

Another line of studies which appears to support the concept of Peterson is that of the German *Gestalt* psychologists.[24] The term *Gestalt* seems to have no exact English translation. Literally it means "*form*," but the connotation includes something more. Several English terms have been used, such as "configuration," "pattern," "figure and ground," etc. It is maintained by these psychologists that the stimulus for a response is always a pattern or configuration. The response is never made to a single isolated stimulus, but to a group of interrelated stimuli. The promulgators of this theory include Kohler [25] and Koffka [26] and the results of their experimental studies tend to support their theory.

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[22] Perrin, F. A. C. and Klein, D. B. Behavioristic Psychology, 1927, p. 232ff.

[23] Peterson, J. "Learning When Frequency and Recency Factors Are Negative." J. Exper. Psychol., 1922, 5, 270-300.

[24] The work of the Gestalt Psychologists is summarized and evaluated in a series of four articles found in the Amer. J. of Psycho., Vols. 36 & 37.

[25] Kohler, W. "An Aspect of Gestalt Psychology." Ped. Sem., 1925, 32, 691-723, and Mentality of Apes, 1925.

[26] Koffka, K. "Perception: An Introduction to the Gestalt Psychologie." Psychol. Bull., 1922, 19, 531, and Growth of the Mind, 1928.

(2) Thorndike's Law of Effect. Thus far, nothing has been said of the part played by the consequences of a response. Thorndike calls this factor in learning the *Law of Effect*. In one place he states this law as follows:[27] "To the situation, 'a modifiable connection being made by him between an S and an R and being accompanied or followed by a satisfying state of affairs,' man responds, other things being equal, by an increasing strength of that connection. To a connection similar, save that an annoying state of affairs goes with or follows it, man responds, other things being equal, by a decrease in the strength of the connection."

But the Law of Effect implies a retroaction of the consequences of a response. If the results of a response are satisfying, the response is "stamped in." If they are annoying, it is "stamped out." However, it is difficult to see how this could be true in every form of learning. There are some types of learning activity where the consequences are not known for some time after the response is completed. But the formation of the connection is effected at the time the response is made. Consequently, how can the effect of a reaction become retroactive upon the nerve trace that is left in the nervous system?

The present writers, therefore, will not include this factor among the fundamental laws of learning. It is merely a part of the Law of Drive. The consequences of a response tend to set up new drives, either positive or negative. If the effect is satisfying, the original drive is strengthened and this results in the strengthening of the neural connection through continued responses. If the effect is annoying, a new drive takes the place of the original one or a new mode of response is introduced. The result is a weakening of the neural connection because of a discontinuation of the given response.

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[27] Thorndike, E. L. Educational Psychology, Vol. I, p. 172, 1913. By permission of the author.

(3) The Authors' Theory of Concomitance of Drive and Response. It is held by the present writers that the only true purposive behavior of boys and girls is the behavior in which there is a concomitant relationship between the drives and responses. If a child initiates a goal along a certain line of behavior and is given an opportunity through its own responses to consummate this goal, then we have purposive behavior in the truest and fullest sense of the word. The inner urges of the child provide the dynamics of behavior. If the behavior of the child can eventuate in the consummation of self-initiated goals the outcome is more rapid learning, more permanent learning, and learning which permits broader application to the solution of new problems.

6. Summary. There are two fundamental laws of purposive learning, The Law of Drive and the Law of Response. The Law of Drive may be stated thus: *To condition a stimulus-response mechanism, this mechanism itself must be in a state of readiness to initiate goals along a particular line of behavior.* Various studies of an experimental nature have been made on the effect of different phases of drive upon the results of conditioning or learning. Several experimenters found that when the child learned with the purpose of reinstating at some future time what had been learned the learning was more permanent. Others found that a drive for learning could be created by constantly keeping the child informed as to the progress, the success and failure he was making. The results of several studies indicated that encouragement created a better drive for learning than discouragement. One study verified the theory of Dewey, namely, that students put forth greater efforts along those lines of activity in which they are interested.

The most elaborate study was on child-purposing as a means of securing a drive for learning. The children were given opportunity to initiate and consummate their own goals in the school rather than being required to follow a formal program of studies. The results of this study indicated that learning taking place under this condition was more rapid and had a more far-reaching effect in the home and community life of the children than did the traditional method of training children.

The nature of purposive learning is not very well known. One theory as to its nature is that learning, in order to be lasting, must eventuate in the consummatory response. Whether a response will be fixated in the form of a conditioned response is dependent upon its relation to the dominating consummatory response. If it tends to further progress toward the final goal it will be fixated; if it hinders or retards this progress it will be eliminated. This theory is supported to some extent by the findings of the *Gestalt* psychology. Another theory maintains that the drive for behavior is dependent upon the consequences of the response. If the effect of the response is satisfying there is a drive for this mode of behavior and the response will be continued; if the effect is annoying the response will be discontinued. A final theory is that in order to secure a drive for a given line of behavior there must be a state of concomitance between the drive and response. In other words, in order to secure the most desirable results in learning the prevailing drive must be along the desired response, or, conversely, the response must be in the direction of the prevailing drive.

CHAPTER X

THE LAWS OF CHANGE IN PURPOSIVE BEHAVIOR: THE LAW OF RESPONSE

1. **The Law of Response.** In the preceding chapter it was shown that the most satisfactory results of learning can be obtained when the situation to which the child is to respond is consistent with the prevailing drive of the child. This, it was pointed out, is the first fundamental law of purposive learning. The second fundamental law of purposive learning is the Law of Response. In the discussion of these laws it should be kept in mind that they are not mutually exclusive. Much of the element of drive is present in the response. Likewise the drive is dependent upon the responses that are made. Both factors are present in most learning and they are practically inseparable. The two are differentiated here only for convenience of discussion.

Thorndike[1] calls this second factor of learning the Law of Exercise and defines it as follows: "The Law of Exercise comprises the Law of Use and Disuse. The Law of Use is: When a modifiable connection is made between a situation and a response, that connection's strength is, other things being equal, increased. By the strength of a connection is meant roughly the probability that a connection will be made when the situation recurs. Greater probability that a connection will be made means a greater probability for the same time, or an equal probability, but for a longer time. . . . The Law of Disuse is: When a modifiable connection is *not* made between a situation and a response during the length of time, that connection's strength is decreased." The explanation and qualifications stated in connection with the Law of Use apply also to the Law of Disuse. Thorndike wishes it understood at this point that in considering the "making" of a connection the vigor and the duration of the connection-forming process should be considered as well as the number of times the connection is made. Degrees of strength of connection in behavior may be defined in terms of anatomical or physiological changes in the nervous system.[2]

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[1] Thorndike, E. L. Educational Psychology, Vol. II, p. 2ff., 1913. By permission of the author.

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[2] Modification of resistance at the synapse due to exercising a given function is probably the most generally accepted physiological explanation of learning in the field of education to-day. However, there is some evidence to indicate that this theory implies too sharp a localization of neural changes. Lashley, in a study entitled "The Theory that the Synaptic Resistance Is Reduced by the Passage of the Nerve Impulse," Psychol. Rev., 1923, 31, 369, used two types of animal, namely, the rat and the monkey, in order to investigate this problem. In the first experiment he effectually blindfolded the left eye of a white rat and trained it to avoid the brighter of two lights in a discrimination box. When discrimination was perfect the blindfold was transferred to the right eye. The rat showed perfect discrimination with the left eye which had not been used at all during the formation of the habit. In this case there could scarcely be any wearing down of the resistance of the synapses connecting the left eye with the motor pathways. Similar results were obtained with the monkey. In this case the animal was temporarily paralyzed in the left arm and hand by removal of the so-called motor area of the right hemisphere. Under this condition the monkey learned to open a variety of latch boxes with his right hand. Then the animal was kept without further training until the left hand had partially recovered. In the meantime the left motor area had been removed, resulting in the paralysis of the right hand. When the monkey was again placed at the latch boxes he found that his right hand, which had been used in developing the original habit, was impotent in manipulating the latches. But he attacked them with his untrained left hand and released them *without random movements* and almost as quickly as he had formerly done with his right hand after protracted training.

Here are two types of habit formation which cannot be explained by any wearing down of synaptic resistance through the passage of the nerve

The statements made by Thorndike bring out the principle it is desired to emphasize here. The connection between a stimulus and a response is strengthened when certain conditions of stimulation and response prevail. It was pointed out in Chapter VIII on "The Conditioned Mechanism" that conditioning of behavior takes place when a response is made to a given stimulus which is repeated several times. It was also indicated that certain conditions of stimulation facilitate and others retard this modification of behavior. In a later section of the present chapter, some experimental evidence bearing on these facts will be presented.

Since all the discussions in this connection thus far have been in terms of stimulus and response, the term *response* will be used instead of Thorndike's *exercise*. The second law of purposive learning, therefore, will be called the *Law of Response* and it may be stated as follows: *A stimulus-response mechanism is conditioned when a response is made to a substitute stimulus which is consistent with the prevailing drive of the child.*

2. An Illustration of Learning Through Responses Made to a Situation. The Law of Response is much better understood than the Law of Drive and the experimental work which has been carried on in connection with it is almost unlimited. As far as the general functioning of this law is concerned it will not be necessary to present extensive argument and illustrative material. Perhaps a single case of

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impulse. The behavior is of a complex character approaching human ideational learning.

No alternative theory of learning has been established. However, one of the writers has discussed the possibilities of a theory based on the temporal (chronaxic) changes which the nervous system and muscles are known to undergo due to their functioning. The reference to this discussion is M. O. Wilson, "A Neural Theory of Association," University of Oklahoma Bulletin, Proceedings of the Oklahoma Academy of Science, 1929, 9, Social Science Section.

learning studied experimentally and represented in graphical form will be sufficient to show how growth in terms of conditioned responses takes place.

One of the earlier studies of learning was that of Bryan and Harter,[3] in which the activity concerned was communication by the telegraphic language. Improvement was measured in both phases of this activity, namely, sending messages and receiving messages. Figure 8 is a graphical representation of improvement in these two activities. The numbers along the base line (x-axis) represent successive responses in terms of weeks of practise. The numbers along the vertical line (y-axis) represent the improvement in re-

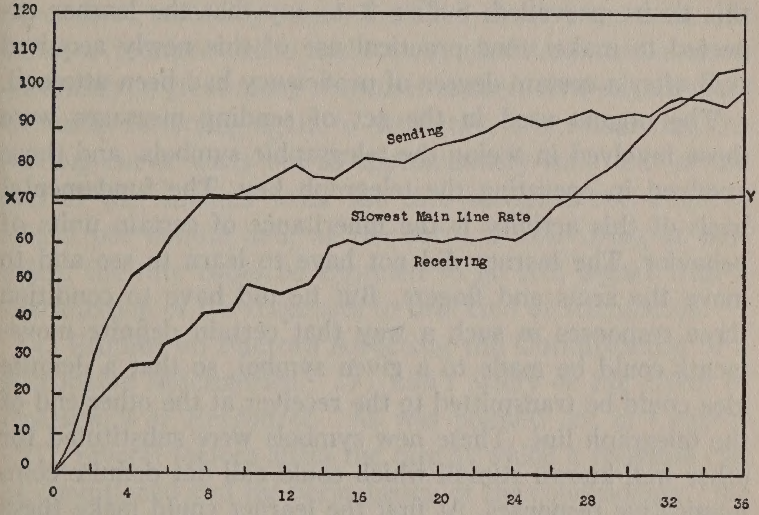

FIGURE 8.—Improvement in Telegraphy. An illustration of the functioning of the law of response. (After Bryan and Harter)

sponses in terms of the number of letters sent or received per minute.

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[3] Bryan, W. L. and Harter, N. "Studies in the Physiology and Psychology of the Telegraphic Language." Psychol. Rev., 1897, 4, 27-53, and 1899, 6, 348-375.

In this activity it may be assumed that the Law of Drive functioned in that the learner desired to learn to communicate and receive messages by means of the telegraphic language. It is needless to go into lengthy discussion as to why this desire prevailed. Suffice it to say that the learner expected to make some practical use of this newly acquired skill after a certain degree of proficiency had been attained.

The organs used in the act of sending messages were those involved in seeing the telegraphic symbols, and those involved in operating the telegraph key. The fundamental basis of this activity is the inheritance of certain units of behavior. The learner did not have to learn to see and to move the arms and fingers. But he did have to condition these responses in such a way that certain definite movements could be made to a given symbol, so that a definite idea could be transmitted to the receiver at the other end of the telegraph line. These new symbols were substituted for other well-known stimuli which could call out definite communicative responses. At first the learner could make these communicative responses to the new symbols at a very slow rate. Reference to the sending curve in the figure shows that the rate was almost zero. But by the eighth week of response-making the curve rose to seventy letters per minute, which was approximately equivalent to the slowest rate at which commercial messages are sent over main telegraph lines. By the end of the thirtieth week the rate was up to approximately one hundred letters per minute.

The changes which took place in learning to send were similar to those taking place in learning to receive messages. The organs involved in receiving telegraphic messages were those involved in hearing and those involved in taking down the messages in the form of records. Again, the basis of this activity is the inheritance of certain units of behavior. One does not have to learn to hear the sound of a telegraph instrument. But the auditory symbols coming from the instrument are new or substitute stimuli to which, heretofore, recording responses have never been made. In order to interpret these auditory symbols and record them accurately, a great many responses to these new stimuli must be made. Referring again to the figure, it is found that the sending curve starts out at approximately zero. But at the end of the thirtieth week the rate exceeded one hundred letters per minute and, as the curve is still rising at that point, the rate could be expected to go still higher with a continuation of the responses to this kind of stimulation.

3. **Studies on Factors Affecting the Conditioning of a Purposive Mechanism.** *(1) Luh's Study on the Effect of Frequency of Responses.* As was pointed out in Chapter VIII, several factors affect the rate at which a response can be conditioned and the permanency of the conditioning. One of these factors is the number of responses made to the conditioning stimulus. Luh [4] investigated this problem to considerable length. He had his subjects learn material so that various degrees of mastery were obtained, as 33.0%, 100.0%, and 150.0%, and then tested the subjects for immediate retention. He found that retention varied directly with the frequency of responses made to the stimulus. As the number of responses increased the degree of retention increased.

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[4] Luh, C. W. "The Conditions of Retention." Psychol. Monog., 1922, 31, No. 3.

(2) Luh's Study on Effect of Recency of Responses. Another factor affecting the permanency of a conditioned response is the recency of the conditioning process. The more recent has been the response made to a conditioning stimulus the stronger will be the connections of the modified form of behavior. As has been indicated several times before, the strength of a connection tends to weaken with time unless there is subsequent exercising of this connection. It does not require, of course, any lengthy argument to convince the reader that retention does become weaker through disuse of a given response. This process of deterioration is observed in the walks of everyday life. One sees it in loss of ability to recall street addresses, telephone numbers, names, lock combinations, and directions for accomplishing certain tasks. It is observed in the loss of skills, as in playing the piano, operating the typewriter, and pitching baseball. No baseball pitcher likes to go into the box without an opportunity to "warm up." But what he calls warming up is largely a short series of responses immediately before the act of formal ball pitching to overcome any loss of his skill due to a period of inactivity before the game.

Many studies of an experimental nature, among which is that of Luh's referred to above, have been worked out to determine the effect of disuse of a response upon the deterioration of connections. They all show that in the ordinary activities engaged in the connections that are formed soon lose most of their efficiency. Theoretically at least, if a neural mechanism has once been used, the effects in terms of increased facility in relearning are never entirely lost. This has been shown to be more or less true by having the learner reinstate the connection by subsequent responses. The connection can usually be formed with fewer responses the second time than was required the first, although the learner may have completely forgotten the original learning experience.

(3) Effect of Length and Distribution of Periods of Response. It was also shown in Chapter VIII that conditioning of a response takes place more rapidly if the responses are discontinuous or distributed, rather than continuous or concentrated. A number of experimental studies have been worked out to determine the validity of this statement, and in general it has been found to be true. Just how long a child should continue to study a certain problem before changing to some other, thereby keeping up a state of drive is not definitely determined. The length of the period will vary with the problem, the child, and perhaps other factors. Likewise, how often a child should work at a certain problem and at the same time keep up a high degree of readiness for the work will vary with the child, the problem, etc. But the outcome of various studies along these lines of investigation indicate that there is an optimum length of time and degree of distribution of responses. Studies of this nature have been made by Munn,[5] Dearborn,[6] Leuba and Hyde,[7] Thorndike,[8] and other writers. One study by Pyle[9] may be referred to here to illustrate the influence of the length of the period of responses. The activity used was substituting one set of symbols for another set of symbols. After a preliminary practise of sixteen days in which the response periods were the same length for all students, the students were divided

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[5] Munn, A. F. "The Curve of Learning." Arch. of Psychol., 1909, No. 12.

[6] Dearborn, W. F. "Experiments of Learning." J. of Educ. Psychol., 1910, 1, 373-388.

[7] Leuba, J. H. and Hyde, W. "An Experiment in Learning to Make Hand Movements." Psychol. Rev., 1905, 12, 351-369.

[8] Thorndike, E. L. "Mental Fatigue." J. of Educ. Psychol., 1911, 2, 61-80.

[9] Pyle, W. H. Psychology of Learning, p. 40ff., 1921.

into groups with a response period of 15 minutes a day for one group, 30 for another, 45 for another and 60 for another. The results are summarized in Table IV.

TABLE IV

THE RELATIVE IMPROVEMENTS IN SPEED OF SUBSTITUTION WHEN THE SAME AMOUNT OF PRACTICE TIME IS DIVIDED INTO PERIODS OF DIFFERENT LENGTHS. (From Pyle.)

Group	*Length of Period*	*Relative Improvement*
A	15 Minutes	22.3 per cent
B	30 "	36.1 " "
C	45 "	25.0 " "
D	60 "	14.8 " "

For this particular group of students and the activity involved, the best length of response period is thirty minutes. The least productive period is sixty minutes. However, as was stated above, the length of period will vary with individuals and the activity involved, other factors being constant.

Starch[10] made a study of the distribution of time given to responses made in a similar activity, namely, substitution of one symbol for another symbol. In this study the time was distributed as follows: Ten minutes twice a day, twenty minutes once a day, forty minutes once a day, and one hundred twenty minutes at one time. The total time in each of the four distributions was the same. The results of this study are represented graphically in Figure 9.

The results of this study indicate that the most efficacious distribution of one hundred twenty minutes of work in the activity involved is to devote ten minutes twice a day for six days to the activity. The next best distribution was

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[10] Starch, D. "Periods of Work in Learning." J. of Educ. Psychol., 1912, 3, 209-213.

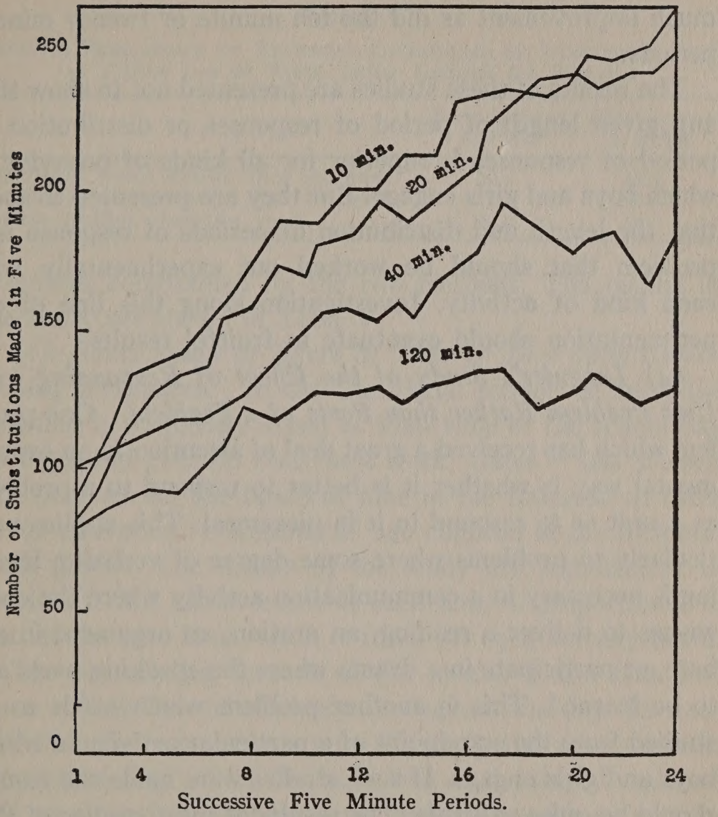

FIGURE 9.—Relative Improvement in Substituting Numbers for Letters According to a Key When the Response Periods Are of Various Lengths. (For the 10 min. curve the group worked 10 min. twice a day; for the 20 min. curve they worked once a day; for the 40 min. curve they worked every other day; and for the 120 min. curve they did all of the work at one time.) (After Starch)

twenty minutes once a day for six days, the next was forty minutes once a day for three days, and the poorest was the total one hundred twenty minutes at one time. The latter distribution, as the curve shows, gave less than half as much improvement as did the ten minute or twenty minute periods.

The results of these studies are presented not to show that any given length of period of responses or distribution of period of responses is superior for all kinds of behavior in which boys and girls engage. But they are presented to show that the length and distribution of periods of response is a problem that should be worked out experimentally with each kind of activity. Investigation along this line of experimentation should eventuate in fruitful results.

(4) Larguier's Study of the Effect of Responding to a Unit Problem Rather than Parts of a Problem. One problem which has received a great deal of attention in an experimental way is whether it is better to respond to a problem as a unit or to respond to it in piecemeal. This applies particularly to problems where some degree of verbatim learning is necessary in a communication activity where the child wishes to deliver a reading, an oration, an argument in debate, or participate in a drama where the speaking parts are to be learned. This is another problem which needs to be studied from the standpoint of a particular activity in which boys and girls engage. If such studies were made the results should be quite valuable. The results of most studies of this nature have shown that better results are obtained if the problem is attacked as a unit rather than by parts. This harmonizes with the unitary nature of purposive behavior.

Larguier des Bancels [11] reports a study in which the activity was to learn a poem. This author was particularly concerned with the relative degree of permanency of

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[11] Bancels, L. des. "Méthodes de Mémorisation." Année Psychol., p. 131, 1903, from Gates, A. I. Psychology for Students of Education, p. 292, 1923.

TABLE V

RELATIVE PERMANENCY OF RESPONSES CONDITIONED BY LEARNING A POEM AS A UNIT AND BY PARTS. (After Larguier des Bancels.)

	Poem Learned by Parts	*Poem Learned as a Unit*
Number of words recalled after one week....	26.6	40.6
Number of words recalled after two years...	6.4	16.6
Percent recalled after two years............	24.0	40.0

responses conditioned by the two methods. The results of the study are shown in Table V.

(5) Gates Study of Effect of Time of Day upon Conditioning Responses. In the traditional schools at least the question is frequently asked at what time of the school day do boys and girls do their best work. Gates [12] has studied this problem for the hours of nine in the forenoon to three in the afternoon for a group of 240 children of the fifth and sixth grades. The results of the study are summarized in Table VI. The achievement at each hour is proportional to that at the 9-10 hour which is 100.0 for each activity listed.

The outstanding feature of the results is the fact that there is little loss of efficiency throughout the day. In most activities the responses are only slightly better at subsequent hours than they are at the beginning of the day. In general one may conclude that boys and girls may work on a problem as effectively at one hour in the school day as at another.

4. Summary. The second law of purposive learning is the Law of Response. It may be stated thus: A stimulus-response mechanism is conditioned when a response is made to a substitute stimulus which is consistent with the prevailing drive of the child. The operation of this law may be illustrated in learning to use the telegraphic languages, either in

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[12] Gates, A. I. Psychology for Students of Education, p. 383ff., 1923. Table reproduced by permission of The Macmillan Co.

sending or in receiving messages. If the child is stimulated by certain telegraphic symbols over a long period of time, its responses become conditioned so that it can convey the message to another individual by use of the telegraphic instrument. Improvement in the process of sending a message takes place somewhat in proportion to the number of responses the child makes. Likewise, in receiving messages from other individuals, the child learns to interpret and write down the messages which are sent in terms of conventional click-symbols of the telegraph instrument. As the number of responses made in receiving messages increases the rate of receiving increases.

TABLE VI

RELATIVE EFFICIENCY OF RESPONSES OF SCHOOL CHILDREN DURING THE SCHOOL DAY. (After Gates.)

The Achievements at the Several Hours Are Proportional to That at the 9-10 A.M. Hour Which Is 100.0 in Each Case. Average Results for 240 Pupils from Grades 5 and 6.

Time	*9-10 A.M.*	*10-11 A.M.*	*11-12 A.M.*	*12-1 N.*	*1-2 P.M.*	*2-3 P.M.*
1. Addition	100.0	102.4	104.2	....	102.3	103.0
2. Multiplication	100.0	101.9	105.1	....	100.9	103.0
3. Memory for Auditory Digits	100.0	105.9	106.7	....	99.4	102.4
4. Memory for Visual Digits	100.0	103.2	109.2	....	99.1	103.4
5. Recognition of Nonsense Syllables	100.0	104.7	105.3	....	100.0	103.7
6. Completion	100.0	105.0	109.7	....	106.2	108.8
Average	100.0	103.8	106.7	....	101.3	104.1
7. Cancellation	100.0	101.8	104.4	....	104.9	105.5
8. Speed and Accuracy of Tracing	100.0	104.6	106.7	....	109.5	111.2
Average of 7 and 8...	100.0	103.2	105.6	....	107.2	108.4

There are various factors involved in the conditioning of responses which have been studied experimentally. One is that the degree to which a response is conditioned depends upon the number of responses made to the conditioning stimulus. Roughly, there is a direct relation between the number of responses and the amount of conditioning. As the number of responses increases, the degree of retention increases. Another factor is the recency of the responses. Other things being equal the more recent the response the stronger is the tendency for it to be made when the conditioning stimulus is presented. A third factor affecting the rate of building a conditioned response and the permanency of it is the length and distribution of periods of response. For each kind of activity there is an optimum length of period during which the responses should be made. Periods shorter or longer than this optimum period do not prove to be as efficient in securing the desired conditioned response. Likewise there is a certain degree of distribution of the periods of response which proves most effective. It is better as a general rule to spread the responses out over a number of days than to attempt to condition completely the response at one time or in one day. A fourth factor is that it is better to attack the problem as a unit rather than by parts. The unit method of attack is better than the part both from the standpoint of the rate at which the conditioned responses are formed and their permanency. A fifth factor is the time of day at which the conditioning takes place. Experimental data indicate that the results of conditioning at different hours in the school day are remarkably uniform, although there is some tendency for the results to be slightly poorer at the nine o'clock hour. Apparently the conditioning of responses is practically as effective at one time of day as at another.

5. Final Summary on the Laws of Change in Purposive Behavior. In a purposive mechanism there are organs which are in the state of readiness to be stimulated, others which are in a state of readiness to react to the stimulating condition, and still others which are in a state of readiness to connect the organs of stimulation with the organs of response. This purposive mechanism works as a unit. The whole boy or girl is active in purposive behavior.

In the present and the preceding chapters an attempt has been made to show how a change can be brought about in a purposive mechanism. First of all, there must be a drive or a state of readiness on the part of the child to initiate goals along a particular line of activity. This is the Law of Drive. The drive of a purposive mechanism can be conditioned. If there is a general state of readiness to initiate a goal along one line of behavior but this general state of readiness is directed to initiate a goal along another line of behavior, the drive involved is conditioned in this respect. Second, there must be a response on the part of the child along the line of the prevailing drive. This is the Law of Response. The response of a purposive mechanism can likewise be conditioned. A response is conditioned when it reacts along the line of a prevailing drive to a substitute or hitherto inadequate stimulus. In short, a purposive mechanism in the child is conditioned when the drive is stimulated and directed to initiate a goal along a new line of behavior and the child is given an opportunity to respond along this new line of behavior and successfully achieve the goal.

In the final summary it may be stated that purposive learning takes places under the following conditions: (1) Provide opportunity for the child to initiate goals which are compatible with its prevailing drives. As Book[13] states in this connection,". . . All new and acquired interests must be built upon the native tendencies to respond with which an individual is already endowed." (2) Provide opportunity for the child to respond along the line of its prevailing drive. It is only through the responses that the child makes that change in behavior can ever take place. (3) Provide opportunity for the responses of the child to eventuate in the successful achievement of the goal along the line of the prevailing drive. According to Book, "No genuine or lasting pleasure can be attached to a subject, or to the performance of a task, unless the worker is succeeding with his tasks. . . . In other words success is required to make a student exert himself fully and vigorously towards his tasks which is the final and most important law that controls the development of what is generally called interest."

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[13] Book, W. F. "How to Develop Interest in One's Task and Work." J. Educ. Psychol., 1927, 18, 6ff. By permission of Warwick and York.

PART III

THE PROCESS OF CHANGE IN PURPOSIVE BEHAVIOR

CHAPTER XI

HOW CHANGES TAKE PLACE IN PURPOSIVE BEHAVIOR

1. Stimulus-Response Mechanisms and Behavior. In Part II we saw that behavior of individuals consists of stimulus-response mechanisms functioning along particular lines. The simplest stimulus-response mechanism we found to be extremely complicated in its make-up. It has many interconnected parts. The more fundamental parts are the following: Receiving end (the organ of stimulation); the sensory neurone; the nerve center, composed of central neurones with their synapses; the motor neurone; and the discharging end (the organ of response). These parts are illustrated in Figures 2 and 3.

The grasping mechanism typically illustrates this organization. The receiving end involves the visual organ of stimulation, namely, the eye. The sensory neurones make up the optic tract which leads from the retina of the eye. The nerve center is composed of the synapses of various central neurones in the brain. The motor neurones are the fibers which conduct the impulse from this nerve center, and which connect with the muscles of the hand. The discharging end involves the organ of response, namely, the fingers of the hand, which produce the act of grasping. The organized parts constitute the grasping mechanism. They make up the neural mechanism involved in grasping behavior.

The symbol S ⟶ R is frequently used to describe the organization of a stimulus-response mechanism. The "S" represents the stimulus, the "R" the response, and ⟶ the neural connection between the "S" and the "R." In the instance of the grasping mechanism the "S" represents the stimulus "seeing the ball" that sets up action in the receiving end and its corresponding neurone. The "R" represents the action in the motor neurone and its corresponding discharging end called "grasping the ball." The ⟶ represents the connection between the sensory and motor neurones which is frequently called a "bond." It connects the particular stimulus, say, ball, with the particular muscular movement, called grasping the ball. A stimulus-response mechanism in terms of the symbols S ⟶ R is the connection between a particular stimulus and a particular response. It involves stimulus, sense organ, sensory neurone, synapse, motor neurone, muscles, and movement. Stimulus, sense organs, and sensory neurone are symbolized by "S," synapse by ⟶ and motor neurone, muscles, and movement by "R." The S ⟶ R symbol thus reduces the complicated organization of a stimulus-response mechanism to a more usable term. It explains the basis of human behavior in any instance of life.

2. How Stimulus-Response Mechanisms Function in Behavior. A Stimulus-response mechanism functions—acts—when a disturbance set-up in its receiving end produces a muscular movement in its final discharging end. It is brought about by successive conduction of the disturbance set-up in the receiving end of the mechanism. If a stimulus, say ball, is presented before the eye of the child in case of the grasping mechanism, a disturbance is set up in the receiving end of the sensory neurone (the eye). This disturbance is conducted by the sensory neurone to the synapse in the nerve center. Here it passes through the synapse to the motor neurone. The motor neurone conducts the disturbance to the discharging end (muscles of the fingers). The muscles of the fingers contract and produce the movement called grasping the ball. Thus the grasping mechanism functions.

In Chapters IX and X (Part II) we saw that two factors are involved in the functioning of stimulus-response mechanisms. They are Drive and Response. These factors are present in the grasping mechanism. Drive, on the one hand, is readiness of the grasping mechanism to successfully conduct along a particular line the disturbance set up in its receiving end. It is a physiological condition of the mechanism disposing it to function at the time. Response, on the other hand, is successive conduction along a particular line of the disturbance set up in the receiving of the grasping mechanisms. It is the grasping mechanism in action. Drive and Response are, in this sense, the constituent factors in the action of stimulus-response mechanisms. They are so in every case, for the action of a stimulus-response mechanism depends, in the first place, upon readiness (drive) to successively conduct a particular disturbance set up in its receiving end, and in the second place, upon successive conduction (response) of the disturbance. Stimulus-response mechanisms, in brief, are the basis of purposive behavior. Drive and response explain how stimulus-response mechanisms function in purposive behavior. Drive is readiness of stimulus-response mechanisms to function; response is their functioning in behavior.

3. **Unity of Stimulus-Response Mechanisms in Behavior.** Studies in Chapter VII (Part II) reveal that stimulus-response mechanisms rarely if ever function separately.

They normally function in aggregate fashion. This fact is typically illustrated in Roly Poly.[1] Many stimulus-response mechanisms function simultaneously in this instance. There are, for example, the mechanisms connected with manipulation—placing the Roly Polys on the triangle, drawing the triangle, making the score board, keeping scores, etc., etc. Then there are the mechanisms connected with finding out things—how to draw the triangle, how to place Roly Polys on the triangle, how to keep score, etc., etc. Another marked group of mechanisms is that group connected with communication—communicating scores to each other, expressing delight at a successful bowl, advising others how to play, etc., etc. Then, too, there are the mechanisms connected with walking to the bowling line, standing with feet on the bowling line, bowling at the Roly Polys, etc., etc. This does not exhaust the list, but these more fundamental ones suffice to illustrate that stimulus-response mechanisms function aggregately along a particular line. Purposive behavior is, in this sense, the functioning of an aggregate of stimulus-response mechanisms along a particular line. Its distinguishing work in every case is the whole child functioning in a situation and is by no means limited to games. The same is equally true with children dramatizing the "Gingerbread Man," making a kiddy-car, finding out how to make divinity fudge, telling the story of "Jack and the Bean Stalk"—in fact anything that engages the whole child. The child, in brief, is a reacting agent. It acts in unit fashion along many lines. This unity action includes an aggregate of stimulus-response mechanisms, for they are the basis of behavior in every instance. This unity of action is purposive behavior.

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[1] See Chapter XIII for an account of the Roly Poly activity.

4. Conditioned Mechanisms in Behavior. In every instance of individual behavior many stimulus-response mechanisms function along a particular line. There were in Roly Poly, for example, many stimulus-response mechanisms in action. Many of the children's mechanisms underwent a change as a result at the time they engaged in this activity. The straight-line mechanism is an illustration. The children could make at the beginning of this game straight-line responses with chalk on the blackboard or floor. Since Roly Poly demands a triangle, this mechanism underwent a change as a result of the introduction of the new stimulus. After the children responded sufficiently to the new stimulus a connection was formed between it and the response of the mechanism. The straight line mechanism was conditioned in the sense that the new stimulus (triangle) called forth a modified response (making a triangle) thereafter. Such a change, we saw in Chapter VIII, is a conditioned mechanism. The conditioned mechanism is in this sense a natural and normal phase of behavior. In the first place, the stimulus-response mechanisms themselves are intrinsically modifiable. Conditioning of a mechanism is for this reason a natural characteristic of stimulus-response mechanisms. In the second place, the modifiability of stimulus-response mechanisms makes it possible for individuals to cope with new stimuli arising in the pursuit of an activity. It makes it possible to condition mechanisms to new stimuli inevitably arising in a situation. The conditioned mechanism is in this sense a normal phase of human behavior. It enables individuals to engage successfully in activities.

5. Illustrations of Conditioned Mechanism in Purposive Behavior. Study of the Roly Poly activity indicates many stimulus-response mechanisms of the children engaging in it were conditioned at the time. There was, for example, conditioning of the throwing mechanisms. At the beginning of the game, these mechanisms functioned along the line of throwing balls through a large circle erected perpendicularly on the floor. At the end of the game, they functioned along a quite different line. They functioned along the line of throwing balls at Roly Polys placed on a triangle drawn on the schoolroom floor. Then there was conditioning of the marking mechanisms. These mechanisms at the beginning of the game functioned along the line of making straight lines on the blackboard in the form of rectangles and other figures of various forms and sizes. At the end of the game, they functioned along the line of making a triangle on the schoolroom floor. Another marked conditioning took place in the communicating mechanisms. At the beginning of the game, these mechanisms acted along the lines of communicating scores in playing Circle Ball, expressing delight at an entirely different type of playing, advising others along an entirely different line, etc. Then, too, there was the conditioning of the working mechanisms, the study mechanisms, the grasping mechanisms, etc., etc. Many stimulus-response mechanisms, in short, were conditioned as a result of the children engaging in this activity. Purposive behavior as illustrated in Roly Poly provides, in this sense, possibility for the conditioning of many stimulus-response mechanisms at the time the game is under way. Modifiability is a fundamental characteristic of purposive behavior for it is through the conditioning of a mechanism that changes in behavior take place naturally and normally.

6. **The Laws of Change in Purposive Behavior.** The conditioned mechanism depends upon two primary conditions underlying the functioning of stimulus-response mech-

anisms. In the first place, it depends upon the state of readiness of the mechanism itself to respond along the line of a new stimulus. This condition is set forth fully in Chapter IX (Part II) in the form of the Law of Drive. Stated briefly it is as follows: To condition a stimulus-response mechanism, the mechanism itself must be in a state of readiness to respond along the line of a new stimulus. This is the first law of the conditioned mechanism and may be called the Law of Drive. In the second place, the conditioned mechanism depends upon the response of the mechanism along the line of the new stimulus. This condition is set forth fully in Chapter X (Part II) in the discussion of the Law of Response. Stated briefly it is thus: To condition a stimulus-response mechanism, the mechanism itself must respond along the line of the new stimulus. This is the second law of the conditioned mechanism. Drive and response of mechanisms are the basic laws underlying the conditioned mechanism. The stimulus-response mechanism, in brief, must be in a state of readiness to respond along the line of a new stimulus and must respond along the line of this new stimulus if conditioning is to ensue.

Study of a particular instance of purposive behavior, for example, Roly Poly, indicates how the Laws of the Conditioned Mechanism operate. First, Roly Poly provided readiness in the children's stimulus-response mechanisms to act along the lines of the new stimuli in the situation. The children were, in the first place, in readiness to engage in this game since it represented action of an aggregation of their own stimulus-response mechanisms to act along this line. They possessed at the time stimulus-response mechanisms in readiness to throw balls, make marks, communicate things about games, move about, grasp balls, etc. Roly Poly provided action for these mechanisms and for this reason the children were in readiness to engage in the game. It provided, in brief, for the operation of the Law of Drive. Second, Roly Poly provided opportunity of response of the children's mechanisms along the line of the new stimuli at the time. Roly Poly included many new stimuli in the sense the children had not responded to these stimuli in previous games. It included, for example, such stimuli as Roly Polys, triangle, bowling lines, Roly Poly scores, etc. To engage in this game the children necessarily had to respond along the line of these new stimuli. They must draw a triangle on the schoolroom floor, stand on the bowling lines, bowl at the Roly Polys, record their scores, etc. Roly Poly provided, in this sense, for operation of the Law of Response of the Conditioned Mechanism. Purposive behavior, in brief, provides for operation of the Laws of the Conditioned Mechanism. First, it provides readiness in stimulus-response mechanisms to act along the line of new stimuli. It provides, in this sense, for operation of the Law of Drive. Second, it provides response of mechanisms along the line of new stimuli. It provides, in this sense, for operation of the Law of Response. Provision for operation of the Laws of Drive and Response is a fundamental characteristic of purposive behavior, for in no way is it possible to condition stimulus-response mechanisms other than in accordance with these laws.

7. **How Changes Take Place in Behavior.** Study of human behavior indicates three important points. The first important fact is that change in behavior takes place through the conditioned mechanism. The child pursues activities along the line of the stimulus-response mechanisms it has in stock at the time. In the pursuit of such activities some of these mechanisms are conditioned as a result of variable

stimuli in situations. The conditioned mechanism is, for this reason, a fundamental characteristic of human behavior. The fact that stimulus-response mechanisms are intrinsically modifiable makes it possible for the conditioning of mechanisms to take place naturally. The further fact that stimuli in situations are extremely variable demands change in behavior to meet the new conditions in situations. The conditioned mechanism makes it possible to modify behavior along the line of the new stimuli in situations.

The second important point concerns the laws of the conditioned mechanisms. The first law demands the following: To condition a stimulus-response mechanism, the mechanism itself must be in readiness to respond along the line of a new stimulus. This is the Law of Drive. The second law demands the following: To condition a stimulus-response mechanism, the mechanism itself must respond along the line of the new stimulus. This is the Law of Response. These laws are fundamental for, in no way, is it possible to condition the stimulus-response mechanisms other than by the presence of these conditions at the time they function in behavior. Change in behavior in brief depends upon the extent of this operation.

The third important fact is that purposive behavior provides for the conditioned mechanisms and its laws. Purposive behavior, in the first place, demands operation of the conditioned mechanisms. Its successful consummation demands modification of many of the children's mechanisms at the time. In Roly Poly, for example, we saw that it demanded modification of the throwing mechanism, the communicating mechanism, the marking mechanism, the studying mechanism, the grasping mechanism, etc. Purposive behavior demands in this sense wide operation of the conditioned mechanism and for this reason provides for many changes in children's behavior. In the second place, purposive behavior provides for operation of the laws of the conditioned mechanism. First, it provides readiness in stimulus-response mechanisms to respond along the line of new stimuli. It provides, in this sense, for the natural and normal operation of the Law of Response. Changes in behavior take place, in brief, through purposive behavior for it provides, first, for wide use of the conditioned mechanism and, second, for the laws underlying its natural and normal operation.

8. Summary. The child, like all things about us, is a reacting agent. The basis of this reaction is stimulus-response mechanisms. These mechanisms function normally in aggregate fashion along a particular line. This unity of action is purposive behavior. The conditioned mechanism operates naturally and normally in human behavior and produces as a result many changes in the activity under way. These changes in behavior constitute learning, growth, education. Purposive behavior provides for the basic conditions of growth. It provides, on the one hand, for wide use of the conditioned mechanism, and, on the other hand, for operation of the laws of Drive and Response. Growth takes place thus through purposive behavior. It takes place in particular through the conditioned mechanism operating in accordance with the laws of Drive and Response in purposive behavior.

CHAPTER XII

THE NATURE OF PURPOSIVE BEHAVIOR

1. Plurality of Mechanisms in Behavior. In the study of Roly Poly it was found that the conditions that brought about action of many stimulus-response mechanisms were inherent in the situation. In the first place, it was found that many mechanisms were in readiness to respond in this instance at one and the same time because mechanisms act in aggregate fashion. There were, for example, the communicative mechanisms in readiness to communicate scores, to express delight at successful bowls, to advise others how to play, etc. Then there were the manipulative mechanisms in readiness to place the Roly Polys on the triangle, to draw the bowling lines, to make the score board, to record scores, etc. Another marked group of mechanisms in readiness were those involved in finding out how to draw a triangle, how to keep score, how to arrange the Roly Polys on the triangle, how to bowl at the Roly Polys, etc. Then, too, there were mechanisms in readiness to walk to the bowling line, to bowl at the Roly Polys, to walk to the score board, etc. In fact the *whole* individual tended toward action in this instance. A multiple of mechanisms were found, in other words, to be in readiness to respond at one and the same time. In the second place, it was found this instance involved a multiple of connected stimuli. There were, for example, the Roly Polys, the triangle, the bowling lines, the score values, the teacher, failures and successes, action of the children, approvals and disapprovals, and dozens of others. It was found to be, in other words, a veritable network of stimuli. Thus the basic conditions of this situation—plural readiness and plural stimuli—brought about the action of many stimulus-response mechanisms along a particular line.

2. Typical Illustrations of Mechanisms in Behavior. A study of Roly Poly reveals, as we have seen, many stimulus-response mechanisms in action along a particular line. Some of the more typical ones revealed in this study are illustrated in the following reactions of the children.

"Pshaw, I'm so tired," remarked James near the close of the story conference. "We've been telling stories so long."

"Let's play Roly Poly," suggested John. "I'm tired too. My feet have almost gone to sleep."

"Gee, we can play Roly Poly," argued Carl. "We can play right in this room."

"Sure," agreed Bobby. "All we'll have to do is to make our triangle and bowling lines."

"Roly Poly is my choice," exclaimed John.

"It's mine too," put in John. "That's two votes—see."

"I'd like to make the sides of the triangle four feet long," suggested James. "You know we have to place the Roly Polys on the lines of the triangle and we want to have plenty of room."

"Let's have three bowling lines," interrupted John. "One should be five feet from the triangle, another ten, and another fifteen."

"Well, I can't see," interrupted Iona, "why we need more than one bowling line. Why can't we all stand on the first one?"

"You don't," interjected John. "But it's more fun to have two or three. Anyway I read in one game book where there can be more than one bowling line and the score you make is always counted by the line you play."

"I think the sides of the triangle are too long," objected Iona. "It would be hard to hit a Roly Poly when they are so wide apart."

"Well, we haven't decided about the size of the triangle yet," explained Bobby. "I want to make each side four feet long, how about it?"

"First thing, we'll have to do is to draw our triangle," suggested Millie. "And I'm what can do it."

"I think we ought to arrange the Roly Polys first," interrupted Neva. "I'd like to do that."

"Shucks no," objected Christine. "We can't arrange the Roly Polys until we make a triangle."

"Sure," agreed Jennie. "I'm for making the triangle first."

"Oh look," exclaimed Lonnie excitedly, "in bowling the Roly Polys I brought down two Roly Polys the first time."

"I think I'll try the third line next time," remarked Jimmie. "It takes so long to make a good score on the first line."

"Yes, and you won't make anything," explained Fred. "I can bring down a Roly Poly every time on the first line."

"You must think so," broke in Jimmie. "If I hit only one I'd make as much as you'd do with three bowls from the first line."

"I'm sure going to practise rolling my balls," remarked Carl. "I can't make a good score until I do."

"Me too," agreed Christine. "It's all in knowing how to roll your ball."

"Gee, Miss Blake, just see how my balls roll," exclaimed Carl, as he rolled the balls toward the Roly Polys. "I'm getting better."

3. Functions of Mechanisms in Behavior. Each stimulus-response mechanism in action performs a definite function in behavior. Study of the mechanisms in action in Roly Poly illustrates this fact. John's suggestion, for example, to play Roly Poly initiated a possible goal for the group to pursue; Carl's explanation that Roly Poly could be played in the schoolroom brought out a phase of its practicability; John's decision to play Roly Poly in preference to the other games suggested helped to set up Roly Poly as the goal for the group to pursue. The function of these mechanisms in behavior may be designated as purposing mechanisms. Similarly, James' suggestion, for example, to make the sides of the triangle four feet long initiated a possible difficulty in the use of such a triangle; Bobby's decision to have the sides of the triangle four feet long contributed toward selection of a necessary means; Millie's proposal to make the triangle first initiated a possible order for executing a means; Christine's explanation that it would be necessary to make the triangle before arranging the Roly Polys brought out a phase of the desirability of the suggested order for executing a particular means; and Jennie's decision to make the triangle first contributed toward selection of the order for executing a particular means. Action of these mechanisms procures the conditions necessary for the attainment of the goal set up. They prepare the means necessary. The function of this group of mechanisms may be designated as preparatory mechanisms. In like manner, Lonnie's bowling at the Roly Polys, Neva's recording her scores, and Carl's computation of his scores achieve the goal-in-view. Action of these mechanisms consummates the goal in question. The function of these mechanisms in behavior may be designated as consummatory mechanisms. Likewise Jimmie's suggestion to bowl from the third line initiated a possible improvement in playing the game; Jennie's explanation that one bowl from the third line would be equal to three from the first line brought out the desirability of a suggested improvement; Carl's decision to bowl from the third line helped to set up a suggested improvement to effect; and Carl's practise in bowling from the third line contributed directly toward an improvement of the game. Action of these mechanisms evaluate the extent of consummation of the goal-in-view. The function of this group of mechanisms in behavior may be designated as judging mechanisms.

The functions performed by the several mechanisms of behavior may be designated, in this sense, as purposing, preparatory, consummatory, and judging. The purposing function involves those mechanisms included in suggesting goals, discussing the desirability and practicability of suggested goals, and the selection of a particular goal to pursue. These mechanisms set up a particular goal. The preparatory function involves those mechanisms included in suggesting particular means for the attainment of the chosen goal, discussing the desirability and practicability of the suggested means, and selecting of particular means to use in realizing the goal-in-view. They prepare the means necessary for attaining the goal set up. The consummatory function involves those mechanisms included in bowling at the Roly Polys, recording scores, and totaling the scores. They attain the goal in question. The judging function involves those mechanisms included in suggesting particular improvements in attaining the goal, in discussing the desirability and practicability of the suggested improvements, in selecting particular improvements to effect, and in consummating the selected improvements. They determine the extent of realization of the goal-in-view.

4. Groupings of Mechanisms in Behavior. Behavior involves, as we have seen, action of an aggregate of mechanisms along a particular line. In acting along this particular line, the mechanisms perform definite functions. These functions, as we have seen, are purposing, preparatory, con-

summatory, and judging. Perhaps, the most fundamental basis for grouping the mechanisms functioning in behavior is according to the function performed, since each performs a very definite function. All the mechanisms functioning in setting up a goal might, for example, be grouped under purposing mechanisms, those preparing the means under preparatory mechanisms, those in actual achievement of the goal under consummatory mechanisms, and those in finding and eliminating shortcomings in the achievement of the goal under judging mechanisms. Each of these groupings include several aggregates of mechanisms, each performing a specialized function. The purposing mechanisms involve, for example, at least three groupings. First, they include a group of mechanisms involved in suggesting goals. John's suggestion to play Roly Poly is an instance. Initiation of Goals is the function performed by this group in the purposing function. Second, they include a group of mechanisms involved in discussing the desirability and practicability of the suggested goals. Carl's explanation that Roly Poly could be played in the schoolroom is an example. Evaluation of Goals is the function performed by these mechanisms in the purposing function. Third, they include a group of mechanisms involved in expressing a preference for a particular suggested goal. John's decision to play Roly Poly is an illustration. Choice of Goal is the function performed by this group of mechanisms in the purposing function. The purposing mechanisms may be grouped according to their specialized function into at least three distinct groups:

Purposing mechanisms
1. Initiation of Goal.
2. Evaluation of Goal.
3. Choice of Goal.

The preparatory mechanisms include at least three groupings. First, they include a group of mechanisms involved in suggesting means. James' suggestion to make the sides of the triangle four feet is an instance. Initiation of Means is the function performed by these mechanisms in the preparatory function. Second, they include a group of mechanisms involved in discussing the desirability and practicability of the suggested means. Iona's objection to a triangle with sides four feet is an illustration. Evaluation of Means is the function performed by mechanisms of this group in the preparatory function. Third, they include mechanisms involved in expressing a preference for particular means. Bobby's choice of a triangle with sides four feet is an example. Choice of Means is the function of these mechanisms in the preparatory function. The preparatory mechanisms may be grouped in this sense in accordance with their specialized function as follows:

Preparatory Mechanisms
1. Initiation of Means.
2. Evaluation of Means.
3. Choice of Means.

The consummatory mechanisms include only one distinct group of mechanisms. They include mechanisms involved in the performance of the means. Lonnie's bowling at the Roly Polys is an illustration. Execution of Means is the function performed by these mechanisms in the consummatory function. This grouping may be indicated as follows:

Consummatory Mechanisms : Execution of Means

The judging mechanisms include at least four distinct groups of mechanisms. They include, first, mechanisms involved in suggesting improvements. Jimmie's suggestion to bowl from the third line instead of from the first is an instance. Initiation of Improvement is the function of these mechanisms in judging function. Second, they include mechanisms involved in discussing the desirability and practicability of suggested improvements. Jennie's explanation that one bowl from the third line is equal to three from the first is an example. Evaluation of Improvement is the function of this group in the judging function. Third, they include a group of mechanisms involved in expressing a preference for particular improvements. Carl's decision to bowl from the third line is an instance. Choice of Improvement is the function of this group in the judging function. Fourth, they include a group of mechanisms involved in consummating the chosen improvement. Carl's practise in bowling from the third line is an example. Consummation of Improvement is the function of these mechanisms in the judging function. The judging mechanisms may be grouped in accordance with their specialized function as follows:

Judging Mechanisms
- 1. Initiation of Improvement.
- 2. Evaluation of Improvement.
- 3. Choice of Improvement.
- 4. Consummation of Improvement.

5. Traits of Purposive Behavior. Study of the mechanisms functioning in behavior reveals, as we have seen, several groupings, each performing a specialized function. They are initiation of goal, evaluation of goal, choice of goal, initiation of means, evaluation of means, choice of means, execution of means, initiation of improvement, evaluation of improvement, choice of improvement, and consummation of improvement. These aggregates of mechanisms constitute the traits of purposive behavior for they are the elements making up behavior of individuals along particular lines. The functioning of these traits is purposive behavior.

The traits of behavior are intrinsically interconnected and interdependent in every respect. Functioning of one trait, for example, evaluation of goals, depends directly upon functioning of the trait, initiation of goal, leads to the functioning of a succeeding trait, in this case evaluation of goals. Retrospectively, the functioning of one trait, for example, evaluation of goals, depends directly upon the functioning of a preceding trait, in this case initiation of goal; prospectively the functioning of one trait, for example, initiation of goal, leads to the functioning of a succeeding trait, in this case, evaluation of goal. The other traits are similarly interconnected and interdependent. They are, in this sense, interconnected and interdependent links in purposive behavior.

Perhaps the most useful terminology for the traits of behavior is the specialized function performed by each trait, as, for example, initiation of goal for the first trait, evaluation of goal for the second trait, etc. Such a terminology is desirable for at least two reasons. First, it indicates the specialized function of the trait in behavior. Initiation of goal, for example, indicates that action of the mechanisms of the first trait initiates the goal of behavior. Second, it indicates the order of the traits. Initiation of goal indicates that the first trait precedes the second trait, evaluation of goal. The following terminology is perhaps a useful analysis of purposive behavior and shows the order of their appearance in a complete purposive act.

Traits of Purposive Behavior

(1) Initiation of Goal
(2) Evaluation of Goal
(3) Choice of Goal
(4) Initiation of Means
(5) Evaluation of Means
(6) Choice of Means
(7) Execution of Means
(8) Initiation of Improvement
(9) Evaluation of Improvement
(10) Choice of Improvement
(11) Consummation of Improvement.

6. Drive and Response in the Traits of Behavior. Any particular trait of behavior, for example, initiation of goal, includes, as we have seen in Chapter VI, an aggregate of mechanisms and, as such, involves drive and response in the functioning of these mechanisms. In the first place, functioning of any particular trait, for example, initiation of goal, involves a drive in the sense the mechanisms included in the trait are in a state of readiness to function along a particular line. Drive, in this sense, is voluntary functioning of the mechanisms included in each of the several traits of behavior. In the second place, any particular trait of behavior, for example, initiation of goal, involves response in the sense the mechanisms included in the trait act along a particular line. Response, in this sense, is action of the mechanisms included in each of the several traits of behavior. Drive and response are thus the cardinal factors in the functioning of the several traits of behavior. Initiation of goal, for example, includes in its functioning drive in initiation of goal as well as response in initiation of goal. The same is equally true in case of all the other traits of behavior, i.e., evaluation of goal, choice of goal, initiation of means, evaluation of means, etc. The presence of these factors determines in every instance the functioning of each of the several traits of purposive behavior.

7. Relation of Drive and Response in the Traits of Behavior. Drive and Response are, as we have seen in Chapters VI, IX, X, the constituent factors in the functioning of any particular trait of behavior. Drive in initiation of goal, for example, involves readiness in this group of mechanisms to function in suggesting things to do while response in initiation of goal involves overt action of these mechanisms in actually suggesting things to do. Drive and response are thus part and parcel of the same thing, namely, in this instance, initiation of goal. They are, in this sense, coordinate—of equal value—for without either, functioning of any trait of behavior would be impossible.

There is yet another fundamental relationship. Drive is, as we have seen, readiness of mechanisms included in a particular trait of behavior to function, while response is overt action of these mechanisms. Drive thus precedes response for without readiness in mechanisms to respond overt response could not occur. Perhaps, the following indicates this relationship:

$$\left.\begin{array}{l}\text{Drive}\\ \text{Response}\end{array}\right\}\text{Initiation of Goal}$$

8. Constituents of Purposive Behavior. Purposive behavior, in terms of the foregoing analysis, involves at least two outstanding characteristics. It involves, in the first place, a series of interconnected and interdependent mechanisms all functioning along a particular line. Each series is interpreted here as a behavior trait. They are initiation, evaluation and choice of goal; initiation, evaluation, and choice of means; execution of means; and initiation, evaluation, choice, and consummation of improvement. The first characteristic of purposive behavior is its series of interconnected and interdependent links between two inclusive points—a beginning and an ending. It is a "complete act." In the second place, purposive behavior involves (1) readiness in each series of mechanisms to function and (2) overt action of these mechanisms. It involves, in this sense, response along the line of drive in the functioning of the several traits. The second characteristic of purposive behavior is the voluntary functioning of its traits. It is a spontaneous act. Purposive behavior, thus, may be interpreted as response of an individual along his drive in initiation, evaluation, and choice of goal; in initiation, evaluation and choice of means; in execution of means; and in initiation, evaluation, choice, and consummation of improvement.

9. A Suggestive Analysis of Purposive Behavior. Any analysis of behavior should include its two outstanding constituents. First, it should include the traits of purposive behavior. These should be presented in the order in which they normally function. Second, it should include the units —drive and response—making up each trait of behavior. And these should be presented in the order in which they normally function. Perhaps, the following analysis is suggestive of the basic constituents of purposive behavior.

A SUGGESTIVE ANALYSIS OF PURPOSIVE BEHAVIOR

$$\left.\begin{array}{l}\text{Drive}\\ \text{Response}\end{array}\right\}\text{initiation of goal}$$

$$\left.\begin{array}{l}\text{Drive}\\ \text{Response}\end{array}\right\}\text{evaluation of goal}$$

$$\left.\begin{array}{l}\text{Drive}\\ \text{Response}\end{array}\right\}\text{choice of goal}$$

$$\left.\begin{array}{l}\text{Drive}\\ \text{Response}\end{array}\right\}\text{initiation of means}$$

$$\left.\begin{array}{l}\text{Drive}\\ \text{Response}\end{array}\right\}\text{evaluation of means}$$

$$\left.\begin{array}{l}\text{Drive}\\ \text{Response}\end{array}\right\}\text{choice of means}$$

$$\left.\begin{array}{l}\text{Drive}\\ \text{Response}\end{array}\right\}\text{execution of means}$$

$$\left.\begin{array}{l}\text{Drive}\\ \text{Response}\end{array}\right\}\text{initiation of improvement}$$

$$\left.\begin{array}{l}\text{Drive}\\ \text{Response}\end{array}\right\}\text{evaluation of improvement}$$

$$\left.\begin{array}{l}\text{Drive}\\ \text{Response}\end{array}\right\}\text{choice of improvement}$$

$$\left.\begin{array}{l}\text{Drive}\\ \text{Response}\end{array}\right\}\text{consummation of improvement}$$

10. Illustration of the Traits of Purposive Behavior. The following illustrates each trait of purposive behavior:

The Roly Poly Activity

Trait 1. Initiation of Goal

I. Explanation: Initiation of Goal includes children suggesting the goal they wish to pursue whether it be in individual or group activity.

II. Illustrations: "Pshaw, I'm so tired," remarked James near the close of the story conference. "We've been telling stories so long."

"Let's play Roly Poly," suggested John. "I'm tired too. My feet have gone to sleep."

"Gosh, John, that's what I want to play too," interrupted Lonnie. "I bet I can win."

"Shame, Lonnie, don't you know what mamma said she'd do if you didn't quit saying that word," scolded Jennie. "I'd like to play volley ball."

"Say kids, I'll tell you what let's do," exclaimed Mary. "Let's dramatize the Gingerbread Boy Story. I just hate old Roly Poly."

"Shucks, Mary, all you can think about is old stories," retorted Bill. "I'd like to play a game of town ball."

Trait 2. Evaluation of Goal

I. Explanation: Evaluation of Goal includes children discussing (before making a choice) (1) the particular things to do in execution of the suggested goals, and (2) the possibility of doing these things. With group activity the group as a whole evaluates the suggested goals. With individual activity, the individual child evaluates the suggested goals with the assistance of the teacher. Evaluation of a goal may occur at the time a goal is suggested, or it may occur after all goals have been suggested.

II. Illustrations: "Billy Johnson, don't you know we'll have to play town ball outdoors?" explained Iona. "We can't play to-day."

"Why?" exclaimed Billy. "All we'd have to do is get the bat, ball, and glove."

"It's raining, don't you see," continued Iona. "We can't play in the rain."

"Shucks, you're just afraid you'll get that new dress wet, I guess," retorted James.

"I know! I know!" exclaimed Carl. "Let's play inside."

"Well! Well! This room isn't big enough," broke in Christine. "We'd have to go outdoors."

"Oh, me," sighed Carl. "I guess you're right."

"We can't play volley ball either," explained Kenneth. "That's hard luck."

"Well, why?" queried Jennie. "All we'd have to do is to put up our net and decide on our score."

"We'd have to play outdoors though," continued Kenneth. "Don't you see it's raining?"

"Gee, we can play Roly Poly," argued John. "We can play right in this room."

"Sure," agreed Bobby. "All we'll have to do is to make our triangle and bowling lines."

"That's not all," disagreed Jimmie. "We have to decide on our rules and make our score board."

"You're right, Jimmie," interrupted Lonnie. "But that's easy."

"I know what we can do," broke in Mary. "We can dramatize the Gingerbread Boy right where we are."

"That's right," agreed Jennie. "But it would take too long to get ready."

"Wouldn't take any longer than Roly Poly," argued Mary. "All we have to do is to select our characters and act out our parts."

"But all of us can't take part," explained Carl. "We can in Roly Poly."

"Can too," retorted Mary. "There's a part for every one. You just don't want a part. I won't take a part in your old Roly Poly either."

"Shucks, Mary, you don't know what you are talking about," interrupted James. "You'll play if the rest of us do, won't she Miss Burke?"

"Surely," remarked Miss Burke. "Whatever the most of us agree on is what we'll do, isn't it?"

"Well, I guess so," grumbled Mary. "I just hate old Roly Poly though I want to dramatize my story."

"Oh! Ho!" laughed John. "I thought so" (referring to Mary's story). "I'm just dying to play Roly Poly."

Trait 3. Choice of Goal

I. Explanation: Choice of Goal includes children indicating a preference for some one of the suggested goals. With group activity, the chosen goal may be the choice of the group as a whole or the group may divide into smaller groups each choosing its own goal. With individual activity, the individual child makes the choice with the assistance of the teacher.

II. Illustrations: "Let's vote," suggested Lucille. "We've discussed everything suggested."

"I'm ready to choose one," added Jennie.

"Me too," shouted Neva. "You know the one getting the most votes is the one we'll do."

"Sure," interrupted Iona. "Oh! I can hardly wait!"

"Roly Poly is my choice," exclaimed Carl.

"It's mine too," put in John. "That's two votes—see!"

"I'm for dramatizing the Gingerbread Boy story," shouted Mary. "That is one vote."

"Put me down for Roly Poly," insisted Lonnie. "That's three votes."

"Yes and me," added Billie. "It's going to be unanimous."

"It's not, smarty," remonstrated Mary. "I never voted for Roly Poly,—see?"

"And Kenneth didn't vote for anything," added Jennie. "Roly Poly got the most votes though."

Trait 4. Initiation of Means

I. Explanation: Initiation of Means includes children suggesting the particular processes necessary in attaining their goal. With group activity, it may be that the group as a whole initiates the means, or it may be that the group divides into smaller groups each initiating means for a particular division of the plan. With individual activity, the individual child initiates all the means.

II. Illustrations: "I'd like to make the sides of our triangle four feet long," suggested James. "You know we have to place the Roly Polys on the lines of the triangle and we want to have plenty of room."

"Let's have three bowling lines," interrupted John. "One could be five feet from the triangle, another ten, and another fifteen."

"I want to know how we're going to keep up with our scores," queried Billie. "Let's make a score board like we use in town ball."

"That's just what I was going to say," added Carl. "Let me make it."

Trait 5. Evaluation of Means

I. Explanation: Evaluation of Means includes children discussing (1) how to perform a particular process, and (2) possibility of performing the process before making a choice. With group activity, it may be the group as a whole evaluates the suggested processes, or it may be the group divides into smaller groups each evaluating a particular part of the suggested processes. With individual activity, the individual child evaluates all of the suggested processes with the assistance of the teacher. Evaluation of suggested processes may take place at the time each process is suggested, or it may take place after all the processes have been suggested.

II. Illustrations: "Well, I can't see," interrupted Iona, "why we need more than one bowling line. Why can't we all stand on the first one?"

"You don't," interjected John. "But it's more fun to have two or three. Anyway, I read in one game book where there can be more than one bowling line and the score you make is always counted by the line you play."

"Yes," agreed Kenneth. "And another thing it said was the score value of the line nearest the triangle is least and the one farthest is greatest."

"Oh! Gee!" broke in Lonnie. "I'll take a chance on the farthest line. I'm better on long throws."

"I won't," objected Neva. "I'd rather be close."

"Girls are little 'fraidy cats' anyway," teased Lonnie. "It's easy from the farthest line."

"Boys think they are so smart," pouted Neva. "Anyway, if I stand on the closest line, I'll not miss so many Roly Polys, I guess."

"Listen here," admonished Carl. "You can stand on any line you wish and you can change any time you wish."

"I don't believe that," argued Lonnie. "Your score is counted from the bowling line you play on."

"I know that," explained Carl. "But you can change any time you wish and the score counts from the line you bowl from."

"How's that done?" queried Billie. "I'd like to know."

"Well," continued Carl. "If you select the first line and bowl a Roly Poly over with your first ball, you'd make one; if you then changed to the second line and hit a Roly Poly with your second ball, you'd make two, see?"

"Yes," replied Billie.

"And if you then changed to the third line and hit another Roly Poly with your third ball, you'd make three," continued Carl. "If you want to, you can throw all three balls from any one of the lines, though."

"I see, now," remarked Lonnie. "I know how, now."

Trait 6. Choice of Means

I. Explanation: Choice of Means includes children's approval or disapproval for use in execution of suggested processes. Choice may be made at the time a suggested process is evaluated, or it may be made after all suggested processes have been evaluated. With group activity, the group as a whole makes the choice. With individual activity, the individual child makes the choice with assistance of the teacher. Preference for or against a particular process is usually (in case of group activity) by voting. Either approval or disapproval counts in choice of means.

II. Illustrations: "Well, we haven't decided on the size of the triangle yet," explained John. "I want to make each side four feet long. How about it?"

"How many of you agree with John?" queried Iona. "Let's vote."

"I'm for four feet," exclaimed Lonnie.

"Me too," added John.

"I'm not," retorted Iona. "What do you say, Mary?"

"I don't care," replied Mary. "I'm not voting."

Trait 7. Execution of Means

I. Explanation: Execution of Means includes children's performance of the processes chosen for attaining their goal. With group activity, it may be that the group divides into smaller groups each performing a part of the processes. With individual activity, the individual child performs all the processes, with the assistance of the teacher.

II. Illustrations: "Oh, look," exclaimed Lonnie excitedly. "I brought down two Roly Polys out of three bowls.'

"My time next," interrupted Neva.

"Five!" yelled Lonnie as he ran to the score board.

"Gee, I hit three," said Neva. "Oh, me! I wish I had been on the second line. It would have counted so much more."

"What's your score?" retorted John.

"Three!" yelled Neva, running to the score board.

Trait 8. Initiation of Improvement

I. Explanation: Initiation of Improvement includes children suggesting changes in the methods of pursuing their goal. It includes changes (1) in choice of means, e.g., elimination, substitution, addition, or modification of processes, (2) in organization of means, e.g., modification of the order in performing the processes, and (3) in execution of means, e.g., performance of neglected means. With group activity, the group as a whole initiates the improvements. With individual activity, the individual child initiates the improvements with the assistance of the teacher. The improvements may be initiated at the time a particular means is executed, or they may be initiated after all means have been executed.

II. Illustrations: "I think I'll know better how to throw my balls next time," suggested Carl. "A lot depends on that."

"Some of the girls didn't stand with their toes on the line," criticized Kenneth. "I saw Neva with her whole foot over the line."

"I think I'll try the third line next time," remarked Jimmie. "It takes so long to make a good score on the first line."

Trait 9. Evaluation of Improvement

I. Explanation: Evaluation of Improvement includes children discussing the desirability and practicability of suggested improvements. It involves discussion of (1) how to perform the improvement and (2) possibility of performing the improvement before making a choice. With group activity, the group as a whole evaluates the suggested improvements. With individual activity, the individual child evaluates the improvements with assistance of the teacher. Evaluation of suggested improvements may occur at the time the improvements are suggested, or it may occur after all improvements have been suggested.

II. Illustrations: "I think I'll try the third line next time," argued Jennie. "It takes so long to make a good score on the first line, no matter how lucky you are."

"Yes, and you won't make anything," objected Fred. "I can bring down a Roly Poly every time on the first line."

"I can, too," retorted Jennie. "But it doesn't count much."

"Shucks, it counts more than missing all the bowls," argued Fred. "You'd never hit a Roly Poly from that back line."

"You just think so," broke in Jennie. "If I hit only one I'd make as much as you'd do with three bowls on the first line, see!"

Trait 10. Choice of Improvement

I. Explanation: Choice of Improvement includes children's selecting improvements to effect. Choice may be made at the time a particular improvement is evaluated, or it may be made after all improvements have been evaluated. With group activity, the group as a whole selects the improvements. With individual activity, the individual child selects the improvements with the assistance of the teacher. Choice of improvement is usually indicated (in case of group activity) by voting. Either approval or disapproval of particular improvements counts as participation in choice of improvement.

II. Illustrations: "You would have done better, Carl, if you had rolled your balls from the bowling lines," suggested John. "You ought to practise rolling your balls."

"That's right," interrupted Christine. "I had the same trouble—seems like I just had to pitch them."

"I'm sure going to practise rolling my balls," remarked Carl. "I can't make a good score pitching my balls at the Roly Polys."

"Me too," agreed Christine. "It's all in knowing how to roll your ball."

Trait 11. Consummation of Improvement

I. Explanation: Consummation of Improvement includes children performing the improvement chosen to effect. It may occur at the time an improvement is chosen or it may occur after all improvements have been chosen. With group activity, the group as a whole may effect the improvements, or it may divide into smaller groups each performing a particular part of the improvements. With individual activity, the individual child performs the improvements with assistance of the teacher.

II. Illustrations: "Miss Burke, may I practise rolling my balls at the Roly Poly?" queried Carl. "I just can't roll them."

"When?" remarked Miss Burke. "You know it's time to go home, don't you?"

"Yes," replied Carl quickly. "But I want to practise rolling my balls anyway. Mamma won't care."

"All right," agreed Miss Burke. "Put the Roly Polys away when you are through."

"Gee, Miss Burke, just see my balls roll," exclaimed Carl, on rolling his balls toward the Roly Polys. "I'll put the Roly Polys away, Miss Burke."

CHAPTER XIII

LINES OF PURPOSIVE BEHAVIOR

1. Basis of Behavior. The individual is, as we have seen in Chapter VII, a reacting agent. It acts in unit fashion along particular lines. The basis of this action, we saw, is stimulus-response mechanisms. These mechanisms function normally in aggregate fashion along particular lines. This unit action of an aggregate of stimulus-response mechanisms along a particular line is purposive behavior. The basis of all behavior is, in this sense, the stimulus-response mechanisms the individual has in stock at any particular moment of life. Studies of human behavior seem to indicate possible lines of purposive behavior in which individuals normally engage. This chapter presents these studies.

2. Kilpatrick's Studies of Behavior. Kilpatrick [1] distinguishes four major lines of human behavior. They are: Producer's Activity, Consumer's Activity, Problem Activity, and Drill Activity. The first line includes activities in which the individual's purpose is to produce something. It ranges from the child's constructive activity in the sand pile to the making of the League of Nations. The second line includes activities in which the individual's purpose is to use something. It ranges from the boy's use of fire crackers on the Fourth of July to the use of the "Gleaners" in decorating a fire-mantle. The third line includes activities in which the individual's purpose is to clear up some difficulty. It ranges from how Mary finds out the name of John's pet rabbit to how plants are formed. The fourth line includes activities in which the individual's purpose is to acquire some degree of skill. It ranges from Bobby's learning how to whistle as well as his dad to Lindbergh's operation of an aeroplane.

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[1] Kilpatrick, W. H. Foundations of Method, Chapter XXI, 1925.

The following are typical illustrations of these lines of behavior:

(1) *The Producer's Activity*
How to make a radio
How to make an angel food cake

(2) *The Consumer's Activity*
How to use pictures in decorating a home
How to use the telephone in communicating with friends

(3) *The Problem Activity*
How people travel in Egypt
How plants get their food

(4) *Drill Activity*
How to write 18 on the Thorndike Handwriting Scale
How to sing "America" according to the musical scale

3. Meriam's Studies of Children's Activities. In the Experimental Elementary School at the University of Missouri, Meriam [2] found that children normally engage in four lines of activities. They are handwork activities, story activities, observation activities, and play activities. Handwork activities include construction of various things in wood, textiles, metal, yarn, and raffia; story activities include story telling, reading, and dramatization; observation activities include study of industries and natural phenomena; and play activities include both indoor and outdoor games, contests, and sports. The following are typical illustrations:

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[2] Meriam, J. L. Child Life and Curriculum, pp. 277-382, 1920.

(1) *Handwork Activities*
Making a doll's dress
Making a snow sled

(2) *Story Activities*
Telling the Gingerbread Man story
Dramatizing Little Red Riding Hood

(3) *Observation Activities*
Study of the country post office
Study of the flowers of the country

(4) *Play Activities*
Playing tenpins
Playing baseball

Professor Meriam[3] conducted a study recently at the University of California of 150 children of random selection between the ages of 6 and 12. The total number of children listed was 2847, distributed in the following manner:

	Cases	*Per Cent*
Play activities	1219	42.8
Work activities (Handwork, etc.)	637	22.6
Observation	577	20.2
Communication (Stories, etc.)	414	14.5

This study indicates the distribution of children's activities among play, handwork, stories, and observation.

4. Dewey's Studies of Children's Activities. For some time at the University of Chicago Professor Dewey[4] experimentally studied the activities of children. Dewey found that the children of his experiment engaged normally in four lines of activities. The first line consists of construction activities. He found boys and girls are always eager to construct something in either wood, cloth, metal, clay, yarn, or paint. The second line consists of communication activities. Children, he found, eagerly express themselves through reading stories, telling stories, singing, and dramatization. The third line consists of exploratory activities. Boys and girls are curious concerning the things about them and express a keen desire to study natural phenomena and country occupations. The fourth line consists of artistic activities. He finds children delight in attaining skill in such activities as folk dancing, drawing, etc. Dewey finds, after several years of study of children, that they engage continuously in four major lines as follows:

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[3] Meriam, J. L. "Children's Activities and the School Curriculum." School and Soc., 1928, 27, 458-462.

(1) *Construction Activities*
  Making a doll house
  Making a watch fob

(2) *Communication Activities*
  Telling the Three Bears story
  Dramatizing Rip Van Winkle

(3) *Exploratory Activities*
  Finding out the names of the flowers in the country
  Finding out how people in colonial times made their clothes

(4) *Artistic Activities*
  Painting a picture of the child's playhouse
  Engaged in folk dancing

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[4] Dewey, J. School and Society, Chapter 2, 1916.

5. Collings' Studies of Children's Activities. Collings [5] conducted an experiment over a period of four years for the purpose of studying children's activities. In this experiment children were afforded opportunity to pursue activities of their own choosing. A record was made of the activities and it was found at the end of the four-year period that the children engaged consistently in four major lines of activities. The first line of behavior consists of Excursion Activities. It includes children's purposes to find out about things in life outside of the school, such as, for example, How to Know the Wild Flowers of the Country, How Our Ice Is Made, How People Travel in Egypt, etc. The second line consists of Story Activities. This line includes children's purposes to communicate things to each other, for example, telling the story of Boy Blue, singing Jolly Old Saint Nicholas, dramatizing The Three Bears, etc. The third line consists of Construction Activities. This line includes children's purposes to construct something, for example, a rabbit trap, a library table, an angel food cake, etc. The fourth line consists of Play Activities. This line includes children's purposes to compete in things, for example, Roly Poly, Bean Bag, Volley Ball, etc. This experiment indicates that children in the elementary school engage normally in the following lines of activity:

(1) *Construction Activities*
How to make a rabbit trap
How to make a sponge cake

(2) *Communication Activities*
How to tell the Story of the Three Bears
How to dramatize the story of Mother Goose

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[5] Collings, E. An Experiment with a Project Curriculum, Chapters 33 and 34, 1923.

(3) *Excursion Activities*
How to know the birds of our community
How our ice is made

(4) *Play Activities*
How to play Roly Poly
How to play tennis

6. **The University of Oklahoma Junior High School Studies of Children's Activities.** During the past six years the Junior High School of the University of Oklahoma has been experimentally studying the activities of boys and girls. This experiment indicates that boys and girls of junior high school age engage normally in five lines of activities. The first line includes Construction Activity in which the purpose of boys and girls is to produce something. Its scope includes purposeful construction in wood, textiles, metal, art, etc. The second line includes Communication Activity in which the purpose of boys and girls is to communicate something. It includes purposeful participation in story telling, reading, dramatization, and writing short stories. The third line includes Exploratory Activity in which the purpose of boys and girls is to find out something. Its scope includes purposeful investigation of industries, occupations, and natural phenomena. The fourth line includes Play Activity in which the purpose of boys and girls is to compete in something. It includes purposeful participation in games, athletics, and contests. The fifth line includes Skill Activity in which the purpose of boys and girls is to perfect something. It includes purposeful practise in singing, instrumental music, drawing, typewriting, public speaking, debating, oratory, mechanical drawing, etc. The following are typical illustrations:

(1) *The Construction Activity*
How to make a radio
How to make an Indian flower vase

(2) *The Communication Activity*
How to dramatize Silas Marner
How to write a short story of the Yellowstone

(3) *The Exploratory Activity*
How wild animals live in Oklahoma
How we predict our weather in Oklahoma City

(4) *The Play Activity*
How to play tennis
How to play basketball

(5) *The Skill Activity*
How to write 18 on the Thorndike Handwriting Scale
How to play the piano according to the musical scale

7. Similarity of Studies of Children's Activities. There appears to be much similarity of the foregoing studies of Children's activities in spite of the fact that the studies were carried on by different educators working independently in different schools over the country. This might be expected since each study is the result of direct study of the activities of boys and girls. Kilpatrick's Problem Activity, Meriam's Observation Activities, Dewey's Investigation Activities, Collings' Excursion Activity, and the University Junior High School Exploratory Activity are practically identical in purpose. They all involve the purpose of boys and girls to find out something. The same is true of Kilpatrick's Consumer's Activity, Dewey's Communication Activities, Meriam's Story Activity, Collings' Story Activity, and the University Junior High School Communication Activity. The purpose to communicate something is the foundation of each of these lines. The Producer's Activity (Kilpatrick), Construction Activity (Dewey), Handwork Activity (Meriam), Hand Activity (Collings), and Construction Activity (University Junior High School) likewise are similar in purpose. Each includes the purpose of boys and girls to produce something. There seems to be some difference between the Play Activity, Artistic Expression, and Skill Activity. The Play Activity is included in three studies—Meriam's, Collings', and the University Junior High School. Artistic Expression is found in only one study (Dewey). The Skill Activity is listed in two studies (Kilpatrick and the University Junior High School). The following lines of activities occur in two or more of the five studies with a slight difference in terminology:

(1) The Excursion Activity
(2) The Communication Activity
(3) The Construction Activity
(4) The Play Activity
(5) The Skill Activity

8. **The Excursion Activity.** The distinguishing feature of the Excursion Activity is its purpose. It involves, as we have seen, purposes of boys and girls to find out something —to explore, to investigate, to discover. Its scope is wide and includes purposeful study of the activities and natural phenomena of community life. The following are typical illustrations:

How people travel in Egypt
How Mr. Smith manages our historical museum
How we make our laws
How to know the wild flowers of our community
How electricity produces our light

How modern inventions have changed our ways of living
How America became a nation

If, for example, the purpose of boys and girls is to find out the names of the wild flowers of the community it is carried on primarily outside of the school since it is necessary to investigate the flowers in the fields of the community. On the other hand, if the purpose of boys and girls is to find out how electricity produces light it is carried on primarily inside the school since study of this purpose demands laboratory equipment and experimentation. This is best provided in the school laboratory. Still, if the purpose of boys and girls is to find out how people travel in Egypt, it is carried on in the school library, for study of the purpose demands investigation of sources dealing with travel in foreign lands. The purpose is, in other words, the determining feature of the Excursion Activity and not its technique of study. It may be, and is, carried on outside of the school, in the school laboratory, and in the school library.

9. **The Communication Activity.** The Communication Activity involves, as we have seen, purposes of boys and girls to communicate something—to converse, to dramatize, to tell. It includes purposeful participation in a wide range of stories in reading, dramatization, story telling, and writing short stories. The following are typical illustrations:

Dramatizing Silas Marner
Reading the story of Tom Sawyer
Telling the story of Evangeline
Writing a short story of the Yellowstone

The Communication Activity is not limited to any particular type of story. It includes the following:

Fairy tales, myths, legends, and fables
Inventions, industries, and science
Animals and natural phenomena
Travel, exploration, sightseeing, and adventure
Hunting and fishing
Humor and fiction
History and biography
Poetry and drama

10. **The Construction Activity.** The distinguishing feature of the Construction Activity is its purpose. Its purpose is to produce something—to make, to create, to fashion. Its scope is wide, and includes purposeful construction in wood, metal, paper, textiles, yarn, leather, cardboard, raffia, reed, rope, clay, paint, water colors, crayola, and foods. The following are typical illustrations:

How Jane made her Chinese flower vase
How Luella made her leather hand bag
How Nadine made her angel food cake
How John made a painting of his father's farm home
How Jim made a clay statue of Daniel Boone
How Tom made his radio
How Jane made her spring dress
How James made his library table
How Wilbur made his fireplace andirons

11. **The Play Activity.** The Play Activity involves, as we have seen, purposes of boys and girls to compete in something—to win, to vanquish, to master. Its scope is broad. It includes purposeful participation in a wide range of games and contests. They may be classified as follows:

Indoor Games—Indoor baseball, basketball, checkers, etc.
Outdoor Games—Volley ball, tennis, football, etc.
Indoor Contests—Debating, typewriting, etc.

The following are typical illustrations of play projects:

1. How to win the Kansas football game
2. How to win the basketball championship
3. How to win the tennis tournament
4. How to win the checker championship

12. The Skill Activity. The Skill Activity involves, as we have seen, purposes of boys and girls to perfect something—to excel, to exceed, to be proficient. Its scope is wide. It includes purposeful practise of a wide range of activities. The following are typical illustrations:

a) How to use the understroke in swimming
b) How to use the punctuation marks correctly
c) How to play America on the piano
d) How to write a short story according to the rules of composition
e) How to typewrite according to the touch system
f) How to sing alto in the glee club
g) How to be a public speaker

13. Illustrations of the Lines of Purposive Behavior. The following stenographic reports typically illustrate each of the four lines of purposive behavior suggested by the foregoing studies of children's activities. These reports are typical illustrations selected from the foregoing studies. They indicate concretely the nature of each of the suggested lines of purposive behavior:

I. *How Mr. Smith Makes Polar Bars*

(Excursion Activity)

I. Purposing.

"Oh, I'm so hot! I never saw such a day before," sighed Bobby as he sank into his seat. "Why, I nearly melted just walking to school."

"I don't think it is very hot," said Alice. "Maybe it's because my mamma had ice cream for lunch to-day. Mother makes the best ice cream I ever ate."

"Why, she doesn't," exclaimed Frank loudly. "Mr. Smith makes better ice cream in his factory than any one could make at home. He puts nuts and strawberries and things in his."

"Mamma makes it with nuts in it too," indignantly retorted Alice. "We had some for a party one time, didn't we, Ruth? Do you remember? You know, you were there, and we all had two dishes apiece."

"Yes, I remember," said Ruth. "That was good ice cream and I was sorry when I had eaten all of mine."

"Oh, yes, old pig," exclaimed Frank. "Girls are always acting so nice and I'll bet they could eat just as much as a boy could if they had it."

"The reason why girls like homemade ice cream," proclaimed Harold, "is because it doesn't cost anything. They never do have any money like boys do."

"Oh, smarty," cried Ruth excitedly. "I'll bet I have more money than you. Your papa doesn't work in a bank and have lots of money like mine. The reason why I like homemade ice cream the best is because it is more sanitary."

"What's sanitary?" demanded Frank.

"Why," explained Ruth, "it's—ah——"

"Oh, ho-ho!" laughed Harold loudly. "She doesn't even know what 'sanitary' means. I do. It's having things all clean and not having dirt, isn't it?"

"Why, Mr. Smith has a clean factory," declared Frank. "Everything is just as shiny and nice down there. He has the floor made of cement, even, so he can wash it by pouring water on it."

"Well, I never have been inside your old factory," declared Alice, "but I'll bet Mr. Smith doesn't scald out his freezer and keep it clean and nice like my mamma does."

"Of course he does," indignantly cried Frank. "He couldn't get the ice cream to freeze if he didn't do that."

"Why silly, that doesn't have anything to do with freezing the ice cream," scoffed Alice. "I've seen people make ice cream without scalding the freezer lots of times and they get it to freeze all right. I think that the thing which makes the ice cream freeze is the little pieces of ice, because it gets harder the smaller the pieces get."

"Aw, that just shows how much girls know," proclaimed Harold. "Whoever heard of people using little tiny pieces of ice to freeze ice cream? That is not what makes ice cream get hard. The salt does that."

"I don't like salty ice cream," piped Marjorie, who had been listening to the others. "I ate some once, over at Mrs. Brown's and it wasn't a bit good. My mother doesn't put salt in hers."

"Why, no one ever puts salt into ice cream, baby," explained Frank. "They put the salt on the ice, outside of the can which holds the ice cream and it can't get inside."

"Just the same," maintained Marjorie, "Mrs. Brown's ice cream did taste salty. I guess she didn't just put it in to taste that way. I'll bet you don't know how to make it and that they do put some inside, too."

"Of course they do," agreed Alice. "I've helped Mother just lots of times, and she always puts salt in. She said she didn't have to do that, but that she liked the flavor better when she did."

"Well, I never would put salt in ice cream to flavor it," declared Harold. "I think vanilla is lots better than salt, and strawberry—oh, boy! I wish I had some now."

"I like pineapple better than strawberry sherbet. It is surely good."

"Oh, I don't like sherbet," scoffed Bobby, who had just rejoined the group. "Ice cream is lots nicer and when we have parties and things, we have brick ice—pink and white. Uh-huh."

"Well, but you can only have the kind you can buy," said Ruth. "When you make it, you can fix it in fancy shapes and colors and make it nicer."

Helen, who had just joined the group, chimed in, “Yes, but you can’t make polar bars at home. I just love ’em. My father brought some home to me last night.”

“What are polar bars?” questioned Marjorie. “I don’t believe I ever tasted them. Are they ice cream?”

“Yes,” said Helen. “They are ice cream, but they are shaped in little squares and have chocolate on the outside of them. Sometimes they are pink, but most of them are white.”

“I’ve eaten lots of polar bars,” boasted Frank. “They cost ten cents apiece, though, and so I usually buy an ice cream cone.”

“But how do you get the chocolate on the outside?” questioned Alice. “I’ve eaten them, but I’ve always wondered about that. When mother and I make candy, we dip the candy into melted chocolate and it gets hard around it, but they couldn’t dip ice cream into melted chocolate, because it would melt the ice cream.”

“Oh, I guess they make the chocolate shell and put the ice cream into it,” Bobbie said. “The way they do ice cream cones, you know.”

“But there isn’t any hole in it,” objected Helen. “I don’t think that that is the way they do it.”

“Miss Green, do you know how they make polar bars?” inquired Bobby. “They don’t make chocolate shells and then fill them up like they do ice cream cones, do they?”

“Why children, I’ll have to admit I don’t know,” smiled Miss Green.

“Maybe Mr. Smith would show us how he makes them,” remarked Alice. “I’d sure like to go to his factory sometime.”

“You bet,” shouted Frank. “That would be great fun. I’ve never seen how they were made either. Of course he just makes the inside like any other ice cream, so I guess if we find out about that it will be just the same.”

“I want to find out if he puts salt in his ice cream,” said Marjorie. “I don‘t believe Bobbie knows very much about it.”

"And I want to see how he makes it pink——"

"And what kind of fruit he puts in it—and——"

"Oh, yes, let's go," chimed in all the children. "Let's go now."

"No," said Miss Green. "We cannot go now. We must see Mr. Smith first and ask him if we can visit his factory. Then if he says it is all right, we can go. Will one of you children ask Mr. Smith if we may visit him?"

"I will," promised Bobbie. "He lives just a little ways from me. I'll ask him if we can go to-morrow."

"All right," assented Miss Green. "Don't forget, Bobbie."

"You bet, I won't," grinned Bobby sweetly.

2. Planning.

The next conference the children were all assembled before Bobby arrived. He rushed in soon after, however, out of breath, but with a grin so broad that the children all knew before he spoke what his report would be.

"We can go! We can go!" he shouted as soon as he got his breath. "Mr. Smith said we could come this afternoon at 2:30, as he would make ice cream then. I had to go on an errand for mother before I could go to see Mr. Smith. That's why I had to hurry so."

"Goody, goody," squealed Marjorie. "I'm so glad we can go."

"Let's write down what we want to find out," suggested Helen. "So we won't forget anything."

"That's a good idea," approved Miss Green. "Who will write on the board for us?"

The children all wanted to, but Alice was finally agreed upon as the children thought she could write so well.

"Well," said Miss Green, "you children may tell Alice the things you want her to write and she will put them down."

"I want to find out about that salt," started Marjorie.

"And I want to know what kinds of nuts he puts in," said Jane.

"We want to see if he makes the ice cream in plain freezers the way we do," said Jack.

"Why of course he does," jeered Raymond. "Whoever heard of anybody making ice cream in anything but a freezer?"

"Well," countered Jack, "they would have to have a big one, to make as much as they do. I suppose though," he added, "that they could use a lot of little ones."

"No, they couldn't do that," objected Frank. "It would take too many men to turn them and they use electricity in most places, I think."

"We'll find out anyway," said Jack.

"Let's not forget to see about how he colors it," added Ruth.

"And we mustn't forget to see how he gets the chocolate on the polar bars," added Marjorie. "I can hardly wait to see that."

"Well," inquired Alice, "are these all the questions you can think of? Shall I read them to you?"

The children said that they should like to have the questions read over, so Alice proceeded as follows:

Is salt used in the ice cream or on the ice?
What kinds of nuts are used in the ice cream?
What kind of freezer is used in making the ice cream?
How is ice cream colored?
What kind of fruit is put in the ice cream?
How is the chocolate put on the polar bars?

"Oh, oh," exclaimed Jack, "we forgot to put down a question about the ice. I want to know about that."

So Alice wrote: What size of pieces of ice should be used?

Then the children decided that their plan was complete and they were ready for their trip.

Miss Green told them that they could start right away, as it was almost two o'clock and it would take them about half an hour to walk to the factory.

3. Executing.

When the children reached the factory Mr. Smith received them with a smile, and the announcement that he was just ready to start making his ice cream. They all went back to the rear part of the factory where there were many queer looking machines and many large cans standing around.

Mr. Smith first explained the pasteurizing process.

"What's a pasteurizer?" demanded Bobby. "I didn't know you used anything like that to make ice cream."

"Yes," replied Mr. Smith. "We use this to purify the milk and to kill any disease germs that may be in the milk."

"Oh," exclaimed Ruth. "I know what germs are. They are little tiny things that you look at under a magnifying glass."

"Yes, and they make you sick when they get inside your body," said Alice. "Once I looked at some in a thing called a microscope; I wish we could get some to look at in school some time. Couldn't we, Miss Green?"

"Maybe so, if the rest of the class wanted to," replied Miss Green. She suggested that they should watch Mr. Smith, now, while he was pasteurizing the milk.

The other children, meanwhile, had been absorbed in watching Mr. Smith.

"I didn't know you had to heat the milk you used," stated Ray. "Do you always do that?"

"Oh, yes," replied Mr. Smith. "I always do that, and I heat the sugar and flavoring too, you see. I'll add them now to warm milk. Then after the milk has been in the pasteurizer for about fifty minutes, I take it out and cool it, then pour it in the freezer."

"But, Mr. Smith," interrupted Paul, "do you use cream or milk in your ice cream? It always tastes so good that I thought you must use cream."

"Well," admitted Mr. Smith, "we do use cream, but sometimes we mix milk with it. The milk we use must have 10 per cent of fat in it, however, or we cannot buy it at all. That is the law in this state."

"May we see your freezer?" inquired Frank. "We wondered whether you would use a big one or a lot of little ones."

"Certainly," agreed Mr. Smith, "I was just going to show it to you when you asked me. It is run by electricity and holds ten gallons of ice cream."

"Do you pour hot water in the ice cream cans to clean them out?" asked Marjorie. "One of the boys said you couldn't get ice cream to freeze if you didn't do that. You could, couldn't you?"

Mr. Smith laughed heartily. "Why, of course, that only makes it cleaner and kills germs which might be in the can."

"See, smarty?" triumphed Marjorie. "We told you that boys didn't know anything about it."

"Just the same, I do know that they don't put salt in ice cream, do they Mr. Smith?" retorted Bobbie.

"No," answered Mr. Smith. "We do use salt, but not in the ice cream. We sometimes put salt on the ice when we pack it. We only freeze the cream a little, about as thick as cooked oatmeal, I imagine, and then put it in the refrigerator to finish freezing by standing."

Mr. Smith explained to them that they did not use salt in freezing ice cream, but that they produced a low temperature by making a cold gas.

"When we get this one freezer full," Mr. Smith continued, "we empty it into a can and freeze another ten gallons. We always keep our ice cream at least three days in the refrigerator before it is ready to sell."

"Why do you keep it so long?" Jane wanted to know. "I always thought things like that are better fresh."

"No," said Mr. Smith, "we don't think so. You see, if we keep this three days, the flavor mixes better with the cream and we think the ice cream is smoother and better when it is treated that way. We could keep ice cream for two weeks in our refrigerator. Wouldn't you like to go through it?"

The children assented eagerly, but surprisedly, as most of them had never thought of going into a refrigerator before.

"I think this is funny," whispered Alice to Helen.

Helen nodded, "So do I; I never heard of a refrigerator like this."

Just then they entered the small room and Mr. Smith closed the door to keep the air out.

"O-o-o-o-o," squealed Marjorie. "Isn't it cold in here? My, I wish I had worn my coat."

"Why, it's just like standing on ice," echoed Helen. "I don't think ice could be colder than this."

"I believe it's colder than ice," shivered Jack. "It's not as cold as this in winter."

Mr. Smith smiled at the children. "Yes," he said, "this is colder than ice. We keep this place below the freezing point for ice most of the time. We'd better go out now," he added, as he noticed the children all shivering.

"Mr. Smith," asked Alice, when they were again on the warm outside, "do you make polar bars? We want to know how they are made."

"Yes," said Mr. Smith. "I make them, and I'm making them to-day. I'll show you how we make polar bars. Just come over here, please."

"Oh, please do," cried all the children together.

"This little box," he explained, "is one of the boxes I use to make brick ice cream. As I explained before, when the cream is partly frozen we take it out of the freezer and finish freezing it by standing it in the refrigerator. This is done the same way, except that when we have brick ice cream of two or three colors we pour in the different colors, one on top of the other, and let them get hard together."

"Oh, yes," smiled Jane, "I'm glad you told us that. I wondered about that."

"When we take brick ice cream out of the molds," proceeded Mr. Smith, "we dip the molds into hot water (demonstrating), so that the bricks will come out into the shape you see them."

"What are molds?" interrupted Harold. "Mother says she has mold on her canned fruit, but I know it isn't that kind."

"I know what molds are," boasted Helen. "Mother and I put jelly into them. It's funny, little, fancy shaped pans that you use to make the jelly pretty when you want to take it out."

"That's right," nodded Mr. Smith, "and that is the same reason why we use molds for ice cream."

"But," interrupted Raymond, "when you put the mold into hot water, the ice cream melts, doesn't it?"

"No," said Mr. Smith, "we just dip the mold in for a second and then take it out so the ice cream won't melt (demonstrating the process). It isn't in the hot water long enough for it to melt. After the ice cream is out of the mold, it is laid on a block and a special knife is used to cut into the little squares we use in polar bars (demonstrating the process). This knife cuts a whole brick at one time."

"How many polar bars do you make out of one brick?" Jane wanted to know.

"Oh, we make about twelve," replied Mr. Smith. "Then, when the ice cream is cut, we stick little wires which have hooks on the other end into the ice cream (demonstrating the process).

"But, Mr. Smith, how do you get the chocolate on the ice cream?" broke in Helen. "That's what I can't understand."

"That's what I was about to explain," replied Mr. Smith.

"Oh! I beg your pardon, Mr. Smith," apologized Helen.

"The hook end of the little wire in the cream," continued Mr. Smith, "is then hung on this long sloping wire. The cream, you see, slides down and is caught by one of the girls we call 'Dippers' who dips the cream bar into the melted chocolate to make the chocolate coating."

"Won't you show us, Mr. Smith, how that's done?" implored Jane. "I'd like to see the girl dip it in the hot chocolate."

"Sure," replied Mr. Smith. "Just watch me now."

"Say, Mr. Smith, why doesn't the hot chocolate melt the ice cream?" queried Helen. "I just cannot understand why it doesn't."

"Well," explained Mr. Smith, "the ice cream is so cold that the chocolate hardens the minute it hits the ice cream."

"Oh, I see," remarked Helen. "Mamma will like to know that."

"The girls hang the little hooks again on the wire and the polar bar slides down to be wrapped," continued Mr. Smith. "See the girl, she's doing that now."

"Oh, let's watch the girl wrap one," suggested Marjorie. "Just see the pretty silver paper."

"Come on," beckoned Mr. Smith. "Miss Jones will show you how to wrap a polar bar."

"But, Mr. Smith, why do you call them polar bars," inquired Jake. "Why don't you call them chocolate bars?"

"Shucks, I know that," interrupted Mary. "Mamma told me that."

"Well, what is it, smarty?" retorted Jake. "Let's have it."

"My mamma said polar means cold," exclaimed Mary. "I know she's right, too."

"Sure, she is," broke in Mr. Smith. "They are called polar bars because they are as cold as the North Pole."

"What do you do with the polar bars when they are wrapped," interrupted Louise.

"They're put into the long ice cream cans in the refrigerator, until we are ready to sell them. Just come here, I'll show you."

"Oh, yes," exclaimed John. "They sure look good."

"And they are," broke in Mr. Smith. "I'm going to give you all one."

"Thanks," came a chorus of voices.

"Mr. Smith, don't you think we could make some polar bars at school?" queried Helen. "We've made lollypops."

"Sure," replied Mr. Smith. "I'll give you enough materials to make some."

"Gee, won't that be fun?" exclaimed John. "We'll do that to-morrow, see."

4. Judging.

"Wish I had another polar bar," cried Bobby the next day as they assembled again.

"So do I," chimed Frank. "I'd like to be in that refrigerator a while, and get cooled off. I'm so hot."

"I can't see how he got the place so cold without any ice," said Alice. "I've been wondering about that."

"Well," said Frank. "He gets it cold the same way they get the water cold at the factory where they make ice."

"Let's go see how they make ice some day," suggested Raymond. "Maybe we could go to-morrow."

"But we didn't find out how they put nuts and fruits in," pointed out Helen.

"No, nor what kind he puts in," added Alice.

"And we forgot about the colors and kind of flavoring used," chimed in Ruth.

"Anyway, I'm glad I went, I found out a lot," said Jack.

The children agreed that they had all enjoyed the trip very much even though they had not followed their plan very well.

5. Leading on activities.

1. How Mr. Jones makes ice.
2. How to make polar bars at school.

II. *How Billy Made His Wagon*

(Construction Activity)

1. Purposing.

"Gee, I wish I had a wagon like Carl's," remarked Billy at one of the hand periods. "I'd like to have one to play with."

"Why don't you make one?" asked Carl. "I made mine."

"Shucks, I can't make the wheels," responded Billy. "I can't saw a circle."

"Oh, that's easy," added Carl. "Miss Jones will show you how."

"I'll see," remarked Billy. "I'd sure like to have one."

"Sure, I'll help you," replied Miss Jones to Billy's inquiry. "Can you get the materials?"

"I think so," answered Billy. "Mamma has a pine box at home that I'm sure she'll give me."

"All right, bring your material to-morrow, and I'll help you plan your wagon," added Miss Jones. "I think the pine box will do."

"I'll get it," remarked Bill joyfully. "Carl'll let me have his wagon to make mine by, I'm sure."

"Be thinking over how you'll want to make your wagon," advised Miss Jones. "We'll discuss the materials, tools, and processes in making the wagon at the next conference."

"I'll find out all I can from Carl," added Billy as the gong sounded.

2. Planning.

"Billy, let's discuss the materials needed in making your wagon first, before you begin your work," suggested Miss Jones at the next meeting.

"I'd like to do so," agreed Billy. "I ruined my sled because I couldn't saw straight."

"Do you have your materials?" inquired Miss Jones. "Seems to me we ought to consider them first."

"There's my box my mamma gave me," replied Billy. "Do I need any more?" He thought he could make the wagon box and wheels from the box.

"What about the tongue?" remarked Miss Jones. "I think your box is all right."

"Oh, I'd forgotten that," answered Billy, rather puzzled. "Carl made his out of heavy wire. I can get some at home just like it."

"I'm sure the wire will do," suggested Miss Jones, "I can think of nothing better."

"I'll make a loop in the end of the wire to pull the wagon by," explained Billy. "I can fasten the other end to the front axle."

"That's a good idea, Billy," approved Miss Jones. "I hadn't thought of the loop in the end."

"Carl's hasn't a loop, but I saw one in the store with one," continued Billy. "I want the loop just big enough for my hand."

"How big are you going to make your wagon, Billy?" inquired Miss Jones at this point. "You'll have to know in order to find out the length of the different pieces of lumber, won't you?"

"Just the same size as Carl's," replied Billy rather quickly. "I'd like to have the wagon box and wheels just the same size."

"Then you can measure Carl's wagon to find out how to cut your lumber," suggested Miss Jones.

"Sure, I hadn't thought of that," agreed Billy. "I'd had the lumber sawed if I'd known how long to cut it. Oh, I don't know how to saw the wheels either."

"The wheels are sawed out with the coping saw," explained Miss Jones. She pointed out that the wheels are first marked off with a pair of compasses.

"But how do you mark them off?" persisted Billy. "I don't see yet."

Miss Jones explained that the size of the wheel is determined by placing one point of the compass on the spindle of the wheel and moving the other point out to the outer edge of the wheel.

"Oh, I think I know now," interrupted Billy. "I'll get the compasses and try." Billy got a pair of compasses, placed one point on the axle of Carl's wagon, and moved the other point out to the edge of the wheel as Miss Jones had explained. He then set the compasses on a plank and marked off a wheel.

"That's it," approved Miss Jones. "You know now how to make a wagon wheel, don't you?"

"Well, I think so," responded Billy proudly. "I'll bore a little hole in the center of the wheel for the nail. That will keep it from bursting the wheel," he explained.

"That's a good idea, Billy," agreed Miss Jones. "Don't you think it would be well to make a list of your lumber specifications now?"

"What do you mean, Miss Jones?" said Billy, rather vexed. "I don't know what you mean by 'specifications' in lumber."

"Oh, I mean to find out the length and width of the different pieces of lumber needed in making your wagon," replied Miss Jones. "I think the ruler might be used in doing this."

"But, I don't know how to use the ruler," persisted Billy. "I didn't use it when I made my sled. I'd like to know how to use it."

Miss Jones explained the ruler at this point. She pointed out the "inch" marks on the ruler and explained that twelve inches equal one foot.

"Let me try it," insisted Billy. "I think I know how now."

"Just a minute, Billy," replied Miss Jones. "The first inch mark is numbered with the figure '1,' the second with figure '2,' and so on."

"Oh, I see," added Billy. "The figure '3' on the ruler means that the piece of lumber would be three inches long, would it?"

"You're right, Billy," approved Miss Jones. "Why not measure Carl's wagon?"

"Shucks, I forgot, but how do you measure the wheels?" asked Billy rather disgustedly. "They're round."

"Oh, by measuring the diameter of the wheels," replied Miss Jones.

"What's the diameter?" frowned Billy. "I never heard of that before, Miss Jones."

Miss Jones explained that a straight line across the middle of the wheel is called the "diameter" of the wheel. She illustrated this point by measuring one of the wheels.

"I know now," remarked Billy. "I'll measure the parts now." Billy proceeded to measure Carl's wagon and found the specifications to be as follows:

Dimensions of Carl's Wagon

2—Sides	6 in. x 14 in.
2—Ends	6 in. x 8 in.
1—Bottom	8 in. x 12 in.
2—Axles	2 in. x 10 in.
4—Wheels	6 in. x 6 in.
1—Tongue	20 in. long

After calculating the lumber specifications, Billy remarked he would need some paint.

"What color do you like?" inquired Miss Jones.

"Red with yellow stripes," he replied. "Carl painted his wagon solid red, but I want yellow stripes on my wagon bed."

"That'll be pretty, indeed," remarked Miss Jones. "How much will you need? There's some red paint in the cabinet."

"Carl said he used a half-pint," answered Billy. "Papa told me it wouldn't take much to make the stripes."

"There's a can of red paint in the cabinet you may use, Billy," added Miss Jones. "But where will you get your yellow paint?"

"Oh, I know, papa has some at home he used in painting our wagon," responded Billy enthusiastically. "About how much will it take, Miss Jones?"

"I hardly know, but I judge about two tablespoonfuls," replied Miss Jones. "Well, I'm sure that will be sufficient."

"I'll need some nails, too, Miss Jones," added Billy. "Carl used four-penny nails in making his wagon box."

"What did he use to fasten the wheels to the axle?" queried Miss Jones.

"I'll see," replied Billy. Billy found that Carl used number eight nails to fasten the wheels to the axles.

Miss Jones explained that there are both kinds of nails in the school cabinet. "All you need to get, Billy, is the yellow paint."

Billy added the following materials to his lumber specifications:

½ pint of red paint
2 tablespoonfuls of yellow paint
Four-penny nails (several)
Four No. 8 nails

"What tools will I need?" inquired Billy at this point. He thought he would need a saw and a hammer. "Oh, yes, I'll need a ruler to measure the lumber."

"You'll need a square to mark your lumber, won't you?" suggested Miss Jones.

"Why sure," he replied. "I'll need a paint brush too."

"How'll you smooth your lumber?" asked Miss Jones. She thought it wouldn't look pretty unless it had a smooth finish.

"Shucks, I'll need a plane and some sandpaper," said Billy. "I saw Carl use the plane and sandpaper in making his bookrack."

"That's right, Billy. You will need a small plane and a piece of sandpaper. Is that all?"

"Sure, not, I'll need a pair of compasses and a coping saw to make the wheels," added Billy. "I'll need a workbench, too." Billy listed the following tools needed in making his wagon:

1—pair of compasses
1—small smoothing plane
1—nail hammer
1—square
1—ruler
1—coping saw
1—piece of sandpaper
1—handsaw
1—paint brush
1—workbench

Miss Jones wanted to know, at this point, if they shouldn't discuss the processes involved in making the wagon. "Do you know how to plane, Billy?"

"Oh, sawing, nailing, and measuring are some of the things I'll have to do," interrupted Billy. "I know how to do these. Do I have to do anything else?"

"Sandpapering, planing, and painting are other processes you'll need," suggested Miss Jones.

"Why, sure, but I don't know how to do either," remarked Billy, rather perplexed. "Won't you show me?"

"I'll be glad to," responded Miss Jones. "I'm sure you ought to learn how to do these processes before beginning work on your wagon."

"I think so too," agreed Billy. "I ruined my sled because I couldn't saw straight."

"Which do you want to do first, Billy?" asked Miss Jones.

"I'd like to learn how to paint first," suggested Billy. "I'll paint this plank if you'll show me how."

"All right, Billy," agreed Miss Jones. "Get your brush and paint." She explained, at this point, that two coats of paint should be applied—the first one to give the wood a faint color, the second one to give the wood a deep red color.

"Do I put both on at the same time?" questioned Billy. "I don't think papa does."

"No," replied Miss Jones. She explained the first coat was applied and allowed to dry before the second coat is put on.

"I'll paint two pieces then," remarked Billy. "One I'll put a light coat on, and the other one a heavy coat."

"That's a good idea," approved Miss Jones. "Go ahead, and I'll help you." Billy practised painting until he was sure he knew the process.

In a similar manner Miss Jones explained the sandpapering and planing processes, and Billy practised each until he acquired sufficient skill to perform each process effectively.

"What part of the wagon do I make first?" inquired Billy at this point. "I'd like to make the wheels first."

"It doesn't make any difference," replied Miss Jones. "It'll be all right for you to make the wheels first." She thought all the parts of the wagon should be cut out first according to the dimensions before assembling.

"Gee, I know now," interjected Billy. "I'll mark off all the pieces, and then saw them. But what should I do next?"

"Plane and sandpaper the pieces," suggested Miss Jones.

"Shucks, I should have known that," remarked Billy, with an air of disgust. "I'll plane the edges first, and then sandpaper the pieces."

"Do I paint the parts before assembling?" queried Billy. "Papa painted our wagon box the last thing."

"No, Billy," replied Miss Jones. "It's always better to do the painting the last thing as your papa does."

"I thought so," agreed Billy. "I'd like to know more about the assembling. I don't understand."

"Oh, Billy, assembling means putting the parts together," explained Miss Jones. "Some parts have to be put together before others can be added."

"I see now," remarked Billy. "I'll have to make the wagon box before I can attach the wheels to the axles, won't I?"

"You're right, Billy," agreed Miss Jones. She explained that the parts of the wagon box should be assembled first, and then the axles.

"Well, when do I fasten the wheels to the axles?" queried Billy. "I'd say when the axles are fastened to the wagon box, am I right?"

"Do I nail the sides to the ends or to the bottom first?" questioned Billy. He thought it would be easier to nail the sides to the bottom and then insert the ends.

"I think so too," said Miss Jones. "But when will you put your tongue on?"

"I'd forgotten it," replied Billy. "I'll put it on when I fasten the axles to the wagon box."

"Then you'll paint it," suggested Miss Jones.

"Sure, Miss Jones," came Billy's answer. "I'll have a wagon then. I'll have my plan in my folder so I can begin work by the next conference," he continued.

"All right, Billy," agreed Miss Jones. "I'll look over your plan at the next meeting."

Billy worked out the following plan and presented it to Miss Jones for her approval.

Plan for Making My Wagon

I. Lumber specifications:

2—6 in. x 14 in. (sides)
2—6 in. x 8 in. (ends)
2—2 in. x 10 in. (axles)
1—8 in. x 12 in. (bottom)
4—6 in. x 6 in. (wheels)
1—wire—20 in. (tongue)

II. Process in Making Wagon:

1. Mark off lumber per specifications.
2. Saw lumber as marked off.
3. Plane and sandpaper parts.
4. Nail sides to bottom of box first, and then insert ends.
5. Nail axles to bottom of wagon box.
6. Fasten tongue to front axle.
7. Attach wheels to the axles.
8. Apply light coat of paint and let dry.
9. Apply heavy coat of paint and let dry.
10. Put two narrow yellow stripes around sides of wagon box—one at the top, and the other at the bottom.

3. Executing.

"Your plan is good, Billy," remarked Miss Jones in going over it with him at the next conference period. "If you'll follow it carefully, you'll have no trouble, I'm sure."

"I'll try to, Miss Jones," agreed Billy. "I'm ready to begin work."

"All right, Billy," continued Miss Jones. "If you need any help come to me and I'll help you."

"I don't think I'll need any," responded Billy smilingly as he hurred to his workbench. "I know every step."

Billy proceeded first to arrange his tools and materials in orderly fashion on his workbench. He then dismantled his box, and marked off the pieces in accordance with his plan. The pieces for the wagon box and axles were first sawed.

"Whew," he was heard to say. "I wish the wheels were sawed too." He proceeded, and "crack" went the coping saw blade. He examined his saw and soon found the pinching was due to his failure to saw squarely across the wood. He hesitated a moment and then decided to consult Miss Jones.

"Miss Jones, I broke my coping saw," he said painfully.

"How, Billy?" she inquired.

"I broke it sawing my wheels," he answered rather disgustedly. "I forgot to saw straight again. I'll bet I'll not break the next one."

"All right, Billy," remarked Miss Jones. "Get another blade, and try it again."

Billy proceeded to put another blade in his saw, and resumed his work. Soon he was heard to say, "I'll see if I'm sawing straight this time." He removed his saw from the lumber and placed the square over the edge of the wheel to see if he was "sawing straight" this time. He had no further trouble.

"Shucks, it won't go," he was heard to say while attempting to plane the pieces of lumber. He tried to solve the difficulty by adjusting the plane blade but with no avail. "I'll have to see Miss Jones again, shucks on it." He explained his difficulty.

"Were you planing with or against the grain in the lumber?" asked Miss Jones.

"What do you mean, Miss Jones?" he responded.

Miss Jones explained what she meant by "grain" in the lumber. She pointed out if he had planed against the grain it would choke the plane.

"I planed this way," explained Billy. "That's against the grain I'll bet."

"Sure," agreed Miss Jones. "You should always plane with the grain in the lumber."

"I know now," interjected Billy. "I'll try it again."

Billy succeeded now in giving his lumber a smooth finish with the plane and sandpaper.

He next assembled the parts of the wagon bed in accordance with his plan. The axles were then attached to the bottom of the wagon box. He consulted his plan again, and was heard to remark to himself with a show of enthusiasm:

"Now, for my wheels." The wheels were successfully fastened to the axles. He pushed the wagon across his workbench several times to see if the wheels rolled properly. Miss Jones stepped up at this point.

"See, Miss Jones, it's a dandy," he remarked with a big smile on his face. "I'd like to make brother Bobbie a cart. He wants one."

"All right, Billy, when you finish your wagon," agreed Miss Jones.

"What do you think of my wagon, Miss Jones?" interrupted Billy, moving it backward and forward on his workbench.

"It's just fine," responded Miss Jones quickly upon looking it over carefully.

"Now, I must put the tongue on," added Billy. "Then I'll paint it red."

"Good," said Miss Jones. "I must help Neva with her doll dress now. If you need me, come, and I'll help you."

"All right, Miss Jones." Billy proceeded to make the wagon tongue. He bent a loop in the end of the wire and fastened the other end to the front axle as he had planned.

"Gee, now for the paint," he exclaimed. He applied one light coat, and placed the wagon in the window to dry. The next day the second coat was applied. Carl stepped up at this point and examined Billy's wagon closely.

"It's finished," said Billy. "I'm going to put two yellow stripes around the wagon box."

"Yes, and that will ruin it," deplored Carl. "How'll you get the lines straight?"

"Oh, that's easy," explained Billy. "You see, I'll make a straight mark around the wagon bed with the ruler."

"Well, I'd leave them off," suggested Carl. "You'll ruin the red paint, now see if you don't."

"Shucks no," persisted Billy. "Papa's wagon has yellow stripes and they're pretty too. Wait till you see mine."

"All right," agreed Carl. "When will you have it finished?"

"Tomorrow," answered Billy. "It'll have the yellow stripes."

"I'll look at it then," added Carl.

Billy put the two yellow stripes around his wagon box as planned. He consulted his plan again and then placed the tools in the cabinet.

4. Judging.

"I've finished my wagon now, Miss Jones," remarked Billy at the next conference. "Say, but it's a dandy, believe me."

"Where is it?" queried Miss Jones. "I'd like to see it."

"I'll get it," interrupted Billy. Billy gets his wagon.

"Oh, it's so pretty," interjected Miss Jones. "Those lovely yellow stripes! Don't they shine in the red?"

"Watch me pull it, Miss Jones," proudly interrupted Billy. "Where's Carl? I like for him to see the yellow stripes too."

"I'm coming," piped up Carl. "I'll be there just as soon as I put my tools away."

"Doesn't it pull a little sideways?" queried Miss Jones. "Try it again, Billy."

"I believe so," added Billy. "Let me see."

"Say, boy, those stripes are pretty," exclaimed Carl. "Let me pull it, Billy."

"All right," agreed Billy. "I thought you'd think the stripes were pretty. Miss Jones thinks so too."

"It pulls sideways," informed Carl. "See it won't follow this line."

"What makes it, Carl?" questioned Billy. "It seems to be in the tongue."

"I think so too," agreed Carl. "It's not in the center, is it?"

"I'll see," broke in Billy. He took the ruler and found that he had made a mistake in measuring the center of the axle.

"It's not in the center," repeated Carl.

"No," replied Billy, "It's a half-inch too far to the right on the axle. Wait, I'll move it over." He measured the center of the axle carefully and then fastened the tongue at this point.

"Now, let me try it," suggested Carl.

"All right," agreed Billy. "I don't see how I made those mistakes."

"Probably you're not careful enough in your work," remarked Miss Jones. "It always pays to measure twice to be sure."

"I'll next time," added Billy. "I sure find it pays to be careful."

"It pulls straight now," interrupted Carl. "I'm going to put a green stripe on my wagon."

"It's all right now," pronounced Miss Jones. "I think you have a fine wagon."

"So do I," added Carl. "I'll trade with you, Billy."

"Oh, no," rejoined Billy. "I'm going to keep it. Bobbie will want it, but I'm going to make him a cart."

"All right," agreed Miss Jones. "We'll discuss it tomorrow."

"I'd like to start Bobbie's cart today," remarked Billy. "We have five minutes yet to work."

"That's right," agreed Miss Jones. "I see we do have some time yet."

"Well, I'll do some more work, too," said Carl.

5. Leading on Activities.

Activities which grew out of this one were:

1. How to make Bobbie a cart.
2. How Carl painted a green stripe on his wagon.

III. *How to Play Roly Poly*

(Play Activity)

I. Purposing.

"Pshaw, I'm so tired," remarked James (near the close of the story conference). "We've been telling stories so long."

"Let's play Roly Poly," suggested John. "I'm tired too. My feet have gone to sleep."

"Gosh, John, that's what I want to play too," interrupted Lonnie. "I bet I can win."

"Shame, Lonnie, don't you know what mamma said she'd do if you didn't quit saying that word," scolded Jennie. "I'd like to play volley ball."

"Say kids, I'll tell you what let's do," exclaimed Mary. "Let's dramatize the Gingerbread Boy story. I just hate old Roly Poly."

"Shucks, Mary, all you can think about is old stories," retorted Bill. "I'd like to play a game of town ball."

"Billy Johnson, don't you know we'll have to play town ball outdoors?" explained Iona. "We can't play today."

"Why?" exclaimed Billy. "All we'd have to do is to get the bat, ball and glove."

"It's raining, don't you see?" continued Iona. "We can't play in the rain."

"Shucks, you're just afraid you'll get that new dress wet I guess," retorted James.

"I know! I know!" exclaimed Carl. "Let's play inside."

"Well! Well! This room isn't big enough," broke in Christine. "We'd have to go outdoors."

"Oh, me," sighed Carl. "I guess you're right."

"We can't play volley ball either," exclaimed Kenneth. "That's hard luck."

"Well, why?" queried Jennie. "All we'd have to do is to put up our net and decide on our score."

"We'd have to play outdoors though," continued Kenneth. "Don't you see it's raining?"

"Gee, we can play Roly Poly," argued John. "We can play right in this room."

"Sure," agreed Bobby. "All we'll have to do is to make our triangle and bowling lines."

"That's not all," disagreed Jimmie. "We have to decide on our rules and make our score board."

"You're right, Jimmie," interrupted Lonnie. "But that's easy."

"I know what we can do," broke in Mary. "We can dramatize the Gingerbread Boy right where we are."

"That's right," agreed Jennie. "But it would take too long to get ready."

"Wouldn't take any longer than Roly Poly," argued Mary. "All we have to do is to select our characters and act out our parts."

"But all of us can't take parts," explained Carl. "We can in Roly Poly."

"Can too," retorted Mary. "There's a part for every one. You just don't want a part. I won't take a part in your old Roly Poly either."

"Shucks, Mary, you don't know what you are talking about," interrupted James. "You'll play if the rest of us do, won't she, Miss Burke?"

"Surely," remarked Miss Burke. "Whatever the most of us agree on is what we'll do, isn't it?"

"Well, I guess so," grumbled Mary. "I just hate old Roly Poly though, I want to dramatize my story."

"Oh, ho!" laughed John. "I thought so" (referring to Mary's story). "I'm just dying to play Roly Poly."

"Let's vote," suggested Lucille. "We've discussed everything suggested."

"I'm ready to choose one," added Jennie.

"Me, too," shouted Neva. "You know the one getting the most votes is the one we'll do."

"Sure," interrupted Iona. "Oh! I can hardly wait."

"Roly Poly is my choice," exclaimed Carl.

"It's mine too," put in John. "That's two votes—see?"

"I'm for dramatizing the Gingerbread Boy story," shouted Mary. "That is one vote."

"Put me down for Roly Poly," insisted Lonnie. "That's three votes."

"Yes and me," added Billie. "It's going to be unanimous."

"It's not, smarty," remonstrated Mary. "I never voted for Roly Poly, see?"

"And Kenneth didn't vote for anything," added Jennie. "Roly Poly got the most votes though."

II. Planning.

"What do we do first?" asked Jennie.

"First thing we'll have to do is to draw a triangle," interrupted Billie. "And I'm what can do it."

"No, I want to draw the triangle," interrupted Iona.

"Oh, pshaw! Girls are always wanting to boss," grumbled Billie. "I'll bet you don't know what a triangle is. Let's see you draw one on the board."

She drew a four-sided figure and James laughed and laughed.

"Oh! Ho!" laughed Billie. "I thought so. A triangle has only three sides."

"My sister Mabel said it had four," answered Iona in defense. "And she knows more than you do, Billie Buchanan Carter!"

"How about it, Miss Burke?" asked Billie.

"James is correct," answered Miss Burke. She brought out the triangle they had been using in their little orchestra.

"See!" said Miss Burke. "A triangle is a surface bounded by three sides."

Iona was convinced.

"How long do we have to make the sides of the triangle for our game?" asked Jennie.

"I'd like to make the sides of our triangle four feet long," suggested James. "You know, you have to place the Roly Polys on the lines of the triangle and we want to have plenty of room."

"Yes, and another rule calls for bowling lines to be drawn on the floor at a certain distance from the triangle," suggested Neva.

"When you draw that triangle, does the top of the triangle face the bowling lines?" asked Lonnie. "I forget."

"That's a good point," suggested Miss Burke. "I wonder who can answer Lonnie's question?"

"Yes, the top of the triangle has to face the bowling lines," answered Christine. "I read that two or three times so I wouldn't forget it."

"How many bowling lines do we need in this game?" asked Jimmie.

"Let's have three bowling lines," interrupted John. "One could be five feet from the triangle, another ten, and another fifteen."

"Well, what I want to know," said Billie, looking puzzled, "is how far from the triangle do the bowling lines have to be?"

"Just any distance you want to make them," suggested James.

"Oh, me," sighed poor little discouraged Mary. "I can never play this game. Too many big words. I don't know what bowling lines are."

"Each player has to stand on one of the lines and roll the balls toward the Roly Polys; rolling the balls is called bowling, and the line you stand on is called the bowling line."

"Well, I can't see," interrupted Iona, "why we need more than one bowling line. Why can't we all stand on the first one?"

"You don't," interjected John. "But it's more fun to have two or three. Anyway I read in one game book where there can be more than one bowling line and the score you make is always counted by the line you play."

"Yes," agreed Kenneth. "And another thing it said was the score value of the line nearest the triangle is least and the one farthest is greatest."

"Oh, gee!" broke in Lonnie. "I'll take a chance on the farthest line. I'm better on long throws."

"I won't," objected Neva. "I'd rather be close."

"Girls are little 'fraidy cats, anyway," teased Lonnie. "It's easy from the farthest line."

"Boys think they are so smart," pouted Neva. "Anyway, if I stand on the closest line, I'll not miss so many Roly Polys, I guess."

"Listen here," admonished Carl; "you can stand on any line you wish, and you can change any time you wish. Our rules permit that."

"I don't believe that," argued Lonnie. "Your score is counted from the bowling line you play on."

"I know that," explained Carl. "But you can change any time you wish, and the score counts from the line you bowl from."

"How's that done?" queried Billie. "I'd like to know."

"Well," continued Carl, "if you select the first line and bowl a Roly Poly over with your first ball, you'd make one; if you then changed to the second line and hit a Roly Poly with your second ball, you'd make two, see?"

"Yes," replied Billie.

"And if you then changed to the third line and hit another Roly Poly with your third ball, you'd make three," continued Carl. "If you want to, you can throw all three balls, from any one of the lines, though."

"I see now," remarked Lonnie. "I know how, now."

"Well, we haven't decided about the size of the triangle yet," explained John. "I want to make each side four feet long. How about it?"

"You said you had to put the Roly Polys on the triangle, didn't you?" queried Neva, who found it hard to remember everything.

"Yes, I told you that," replied John sharply. "You have to put one on each corner and two on each side. You have to be sure and have them the same distance apart."

"I think the sides of the triangle are too long," objected

Iona. "It would be hard to hit a Roly Poly when they are so wide apart."

"Aw, Iona! You don't know. You never did play this game," exclaimed Lonnie, with an important air. "That's just the right size. If it was any smaller, you'd miss the whole triangle."

"How many of you think like Lonnie and some of the rest of us?" queried John. "Let's vote."

"I'm for four feet," exclaimed Lonnie.

"Me, too," added John.

"I'm not," retorted Iona. "What do you say, Mary?"

"I don't care," replied Mary. "I'm not voting."

"Well, how about the bowling lines?" insisted Iona. "How many lines do we want and what shall the score value be for each one?"

"How about three lines—one, five feet from the triangle; another, ten; and another, fifteen?" suggested John.

"That's about right," agreed James. "We had that same distance before."

"Well, how about the score value?" interrupted Billie.

"I think the first line should be one; two for the second; and two for the third," answered Neva.

"I want the three lines, all right," said Carl, "but I'd rather have the score values one, two and three. You know, you ought to get more for taking chances on the farthest line."

"I hadn't thought of that," answered Neva. "I believe that would be better."

They all agreed on the score value for the bowling line as one, two, and three.

"How about the balls?" inquired Lonnie. "Do you roll them on the floor or pitch them like Dad does horseshoes? I'd like to know."

"I want to know whether you throw all the balls at once or play only one at a time," interrupted Jimmie.

"Goodness no," replied Kenneth. "You know you don't throw three balls at once—you get three chances, but you roll only one ball at a time. You must remember to roll them—not throw them."

"Let's see you roll one," said Jennie. "I know a lot depends on just the way you use the balls."

"You are right there," answered Kenneth, and proceeded to show what he could do.

"Oh, Kenneth, you forgot something!" reminded Carl. "You know each player has to put the balls in this little box on the first bowling line when he is through."

"Aw, I didn't forget," replied Kenneth, good-naturedly. "You are right, that makes the game go faster."

"Do we play in teams?" asked Carl. "I hope so, and I can be captain."

"Why you wouldn't make a good captain," answered Jennie, quickly. "You are too little. Captains are big and fat. I don't want to play in teams."

"Aw! It's more fun to play in teams!" admonished James.

"I don't care, you are not running the game," interrupted Jennie. "Let's vote."

They agreed to play individually.

"Do you have to stand with your toes right on the line like you have to in Bean Bag?" asked Billie.

"You bet you do," answered Lonnie quickly. "You have to put your toes on the line. If you don't, you lose your turn."

"We've talked about everything 'most but the score. I'd like to know how you count it," suggested Jimmie.

"Well," answered John, "if you stand on the first bowling line and bowl a Roly Poly over with your first ball, you'd make one; if you put over one with the second ball, you'd make two, and if you put one over with your third ball, your whole score would be three. You have to 'holler out' your score real loud every time you roll a ball."

"What if you don't hit any Roly Polys at all?" asked anxious little Jimmie.

"Well, then you'd make a zero," answered Christine.

"I don't know how you'd write it on the board," complained Jimmie.

"Why, you'd make just a figure naught, like this: 'o'," explained Christine, making one for him on the board.

"I'm not much good on figgers," said Jimmie. "What would you make if you made one on the first roll and didn't make anything on the second or third?"

"Why Jimmie," exclaimed Neva, "you know you'd have only one."

"No, he wouldn't," argued Billy. "He wouldn't make a thing, would he Mary?"

Miss Burke had to come to their rescue. She explained and illustrated that such a score would be one, for when a naught is added to one, the sum is one.

"Oh, I remember now," interrupted Jimmie. "When you add naught to another figure, it doesn't change it."

"That is correct," answered Miss Burke.

"Do we have to keep our own scores?" asked Jimmie.

"Yes, don't you remember what I told you about hollering your score out loud each time you rolled?" scolded John.

"What if you don't add right?" asked Jimmie, who was much concerned over his addition.

"Oh, any of us will tell you," answered Lonnie, who knew he was good in numbers.

"Is there anything else we have to consider?" inquired Miss Burke.

"Yes," said Fred, looking puzzled. "How about changing bowling lines? Can you change lines any time you want to while you are playing?"

"Yes, you may," replied Miss Burke. "Your whole score is always determined by the line from which you bowl. If you selected the first bowling line for the first throw and hit a Roly Poly, then selected the second line for your second throw and hit a Roly Poly, and then selected the third line for your next throw and succeeded in bowling over a Roly Poly, what would your total score be?"

"Six," answered James promptly.

"I can't see how you get six," said poor little Jimmie.

"Can you explain, James?" asked Miss Burke.

"Well," answered James. "You see the first bowling line counts one, the second two, and the third three. You'd hardly ever be lucky enough to hit a Roly Poly from each of the lines, but if you did, you'd make six."

"Oh, pshaw, I can't see it," answered Jimmie, scratching his head.

"Well, you can add one, two and three. Can't you do that?" inquired James.

"Oh, yes I see!" responded Jimmie, all smiles once more. "One plus two plus three equals six. Gee! Counting is not hard when you once know how. If you make the most at the end of the game, will you be winner?"

"Of course," said John. "I'm getting terribly anxious to start."

"I wish we could write the rules on the board," suggested Lonnie. "I never can remember everything if we don't."

"Let me do the writing," entreated John, stepping quickly up to the board. "I can write the fastest of anybody here."

They all agreed to let him.

The rules proposed by the different pupils and written on the board were as follows:

Rules for Playing Roly Poly

1. Draw a triangle on the floor, making each side four feet long.

2. Mark off three bowling lines facing the point of the triangle. Make the first bowling line ten feet from the triangle, the second fifteen, and the third twenty feet.

3. Write the figure 1 (score value) at each end of the first line, the figure 2 at the ends of the second line and the figure 3 at the ends of the third line.

4. Arrange the Roly Polys on the triangle, one from each corner and two at the equal distances on each side.

5. The player is to pick out his bowling line from which he is to bowl three balls, one at a time.

6. The player may change his bowling line from time to time, if he likes.

7. The player is to stand with the toe of his shoe on the bowling line when bowling.

8. The player is to put the balls, at the end of each play, in the small box on the first bowling line.

9. The score for each bowling is determined by the score value of the line.

10. Each player is to keep his own score and is to announce it loudly when each bowling takes place.

11. Mistakes in score keeping are to be corrected by the players.

12. The one who makes the highest score at the end of the game is the winner.

Arrangements for the Game

"Now," said Lonnie, "that's done. Aren't we about ready to start?"

"We haven't talked about the things we need," suggested Neva.

"We need nine Roly Polys, don't we?" asked Fred.

"Yes," answered John. "And we need a ruler and chalk to make the triangle and bowling lines."

"We have to have three rubber balls and a small box," interrupted Christine.

"I believe that's about all we need, with the blackboard, chalk and eraser, isn't it?" asked Neva.

No one could think of anything else.

"I'm going to play first," said Jennie.

"You always want to be first," scolded Lonnie. "She always gets the best piece of chicken and everything at home."

"I want to be second," chimed in Jimmie.

"Girls first," suggested Neva.

"Let's have a girl and a boy, a girl and a boy," suggested John. "And I'll tell you. Let's let the one play first who makes the highest score last time we played."

They all agreed to this. They were to play in the following order: James, Christine, Lonnie, Jennie, Jimmie, Iona, Carl, Mary, John, Neva, Kenneth.

"I want to know how we're going to keep up with our scores," queried Billie. "Let's make a score board like we use in town ball."

"That's just what I was going to say," added Carl. "Let me make it."

"I don't know how a score board looks," interrupted John.

"I can't tell you, but I can draw one on the board," answered John. "My dad showed me how to make one."

John worked out the following score board:

PLAYERS

Date: ....

James	Christine	Lonnie	Jennie	Jimmie	Iona	Carl	Billie	Neva	Kenneth	Mary	John
Totals											

"Each time you play, you have to put your score right under your name, and at the end of the game, the total score is to be written at the bottom after the words: 'Total Score,' " explained John.

"What does total score mean?" asked Iona.

"It means all you make in the whole game," answered John proudly.

The score board was then approved by the group.

"You sure can draw," whispered Iona to John.

"Just look here, Miss Burke, all the paint is off this Roly Poly," exclaimed Iona. "May I paint it?"

"Shucks, you can't paint it," objected Billie. "They're all colors."

"Well, I guess I can, smarty," interrupted Iona. "I painted my mamma a vase in all colors."

"All right, Iona," agreed Miss Burke. "The Roly Poly does need a new dress, doesn't it?"

"Sure, I'll paint it at the next Hand Conference," remarked Iona, on placing the Roly Poly on the triangle.

"Now, let's get busy," exclaimed James with a businesslike air. "What do we do first?"

"First thing we'll have to do is to draw our triangle," suggested Billie. "And I'm what can do it."

"Sure," agreed Neva.

"Another thing we have to do is to mark off our bowling lines," added Fred. "I'll make them. I just like to measure."

"We'll have to write the score value on each bowling line before we can play," remarked Lonnie.

"I'll do that."

"Yes, and we'll have to place the Roly Polys on the triangle," suggested Christine. "You do that, Iona."

"I sure will," agreed Iona.

"There's the score board too," interrupted Bobby. "John, you make it."

"That's just what I wanted to do," shouted John. "I'll have it ready by the time Christine gets the Roly Polys on the triangle."

"The next thing we do is to bowl at the Roly Polys, isn't it?" queried Carl. "I can't think of anything else to do."

"You're right, Carl," agreed Jennie.

"Oh! We've forgotten something," exclaimed Jimmie. "We'll have to put our rubber balls in the little box on the first bowling line."

"Well, I'd think so," added Jennie. "We do that just as soon as we mark off our bowling lines."

"Gee!" interrupted Kenneth. "The last thing we do is to add our scores. That's how we'll find out who won the game."

"Oh, goody! goody! we are ready now!" yelled John, jumping up and down. "Every fellow choose his bowling line and bowl in his turn."

III. Execution.

"James, hurry up!" cried Lonnie. "I want to hit a Roly Poly from this farthest line so bad I'm about to die."

"Aw, go on, you can't hit one from there," answered James.

"I'll show you," answered Lonnie, bringing down one Roly Poly.

"Three," he called and ran to the score board to put it down.

They all frequently changed their bowling line during the game, which in no way interfered with its progress.

"Oh, look!" exclaimed Lonnie excitedly. "I brought down two Roly Polys out of three bowls."

"My time next," interrupted Neva.

"Five!" yelled Lonnie as he ran to the score board.

"Gee, I hit three," said Neva. "Oh me! I wish I had been on the second line, it would have counted so much more. I'll remember that next time."

"What's your score?" retorted John.

"Three!" yelled Neva, running to the score board.

But when she went to the score board to write it down, she made the three backwards. They all laughed and Neva almost cried.

"I'll help you," encouraged Miss Burke.

Neva learned to make a good three and went skipping back to the game. On and on they played until the warning gong sounded.

"Come one, let's add our scores," called James.

"Shucks! I'd like to know how to add my scores," remarked Christine. "I'd like to know if I made as much as Neva."

"Well, I guess you didn't," interrupted Neva. "My score is ten, see?"

"Say, Miss Burke, won't you show me how to add my scores?" queried Christine.

"Sure," replied Miss Burke. "I'll help you at the next conference."

"Oh, John, you beat!" said Neva. "I can tell from all those big figures."

"I believe I did," John answered excitedly.

"Miss Burke, I can't hold all of mine in my head," called Jimmie. She assisted pupils when needed in adding their scores.

"John won! John won!" they called cheerfully and good-naturedly.

"Gee, I'd like to keep a record of our scores," remarked Billie, on taking his place on the bowling line.

"Well, silly, why?" interrupted Mary. "Who cares for the old scores anyway, I don't."

"Why, I can tell who wins the most games," explained Billie. "I'm going to make a score booklet to keep our scores in, just watch me."

"Sure," agreed John. "I'll make one too."

"All right," remarked Miss Burke. "Let's wait till we finish our game."

IV. Judging.

"Well, you didn't beat me much anyhow, did you John?" remarked James. "If we had had a few bowls more, I might have tied you. Anyhow, I made something every time. It's all in knowing how to roll the balls. I'll bet you have been practising, John."

"Sure, I have," said John. "I practised rolling balls at home last night, see?"

"Mary, do you know you made the lowest score?" interrupted Carl, in comparing the scores of the players. "I know, you didn't try."

"I don't care, I don't like the old game anyway," retorted Mary. "I can beat you telling stories, I'll bet."

"I think I can make a better score next time," exclaimed Neva. "Anyhow, I know better how to add the scores. That's very important, too."

"Me, too," said Jimmie. "But I sure was out of luck. Those old Roly Polys acted just like they were nailed to the floor every time I tried to hit them."

"I think I'll know better how to throw my balls next time," suggested Carl. "A lot depends upon that."

"Some of the girls didn't stand with their toes on the line," criticized Kenneth. "I saw Neva with her whole foot over the line."

"I think I'll try the third line next time," remarked Jimmie. "It takes so long to make a good score on the first line."

"Yes, and you won't make anything," objected Fred. "I can bring down a Roly Poly every time on the first line."

"I can, too," retorted Jennie. "But it doesn't count much. I can't win on that line."

"Shucks, it counts more than missing all the bowls," argued Fred. "You'd never hit a Roly Poly from that back line."

"You just think so," broke in Jennie. "If I hit only one I'd make as much as you'd do with three bowls on the first line, see?"

"You would have done better, Carl, if you had rolled your balls from the bowling lines," suggested John. "You ought to practise rolling your balls."

"That's right," interrupted Christine. "I had the same trouble—seems I just had to pitch them."

"I'm sure going to practise rolling my balls," remarked Carl. "I can't make a good score pitching my balls at the Roly Polys."

"Me, too," agreed Christine. "It's all in knowing how to roll your balls."

"Miss Burke, may I practise rolling my balls at the Roly Polys?" queried Carl. "I just can't roll them."

"When?" asked Miss Burke. "You know it's time to go home, don't you?"

"Yes," replied Carl quickly. "But I want to practise rolling my balls anyway, mamma won't care."

"All right," agreed Miss Burke. "Put the Roly Polys away when you are through."

"Gee, Miss Burke, just see my balls roll," exclaimed Carl on rolling his balls toward the Roly Polys. "I'll put the Roly Polys away, Miss Burke."

V. Leading on Activities.

1. How Bobby added his Roly Poly scores.
2. How to play tenpins.
3. How John made his score booklet.
4. How Iona painted the Roly Poly.
5. How Billie learned to write his Roly Poly scores.

IV. *How to Dramatize "The First Thanksgiving"*

(Communication Activity)

I. Purposing:

"I think Lester told his story so well," remarked Virginia when Lester had finished telling the story of "The First Thanksgiving".

"I think so too," added James. "And if he had had on his new Indian suit I would have thought it was Massasoit himself."

"My Indian suit was just as nice as Lester's when it was new, but I tore a big hole in the knee the other day," remarked Robert.

"Oh! That is just like you, Robert Smith, you are always doing some careless thing," exclaimed Luetta.

"You just say that because Edgar and I almost frightened you and Virginia to death the other day when we were dressed up playing Indian," retorted Robert.

"Girls are such ' 'fraid cats,' " added Sam.

"Well, I don't think the Pilgrim women were afraid of the Indians and we are not either," replied Ann.

"I'll bet I could scare you, Ann, if I put on my Indian suit and hid behind a tree, and jumped out at you as you passed by," laughed Lester.

"Oh! Of course anyone would jump, but I am not afraid of Indians any more than you are, Lester Clark, so there!" retorted Ann.

"Say, kids, I've an idea," exclaimed Sadie. "Why couldn't we play 'The First Thanksgiving'?"

"That's just like you, Sadie, you always think of something different from everybody else," said Virginia.

"That story would be all right for boys, but what parts could the girls have?" complained Louisa.

"I had not thought of doing this before," said Sadie. "But it seems to me that we could act out the characters it tells about in the story, Priscilla, Mrs. Brewster, Mrs. Hopkins, Mrs. Allerton and Pilgrim women."

"I don't see why we can't act out this story just fine," remarked James, "because we have more boys than girls in our class and some of the boys could be Indians and some could be Pilgrims carrying guns."

"Why, of course," shouted Lester. "I want to be an Indian."

"Not I," exclaimed Frank. "I'd like to be a Pilgrim and carry Daddy's big gun to scare the Indians."

"Oh! I just love to be in plays, I wish we could play this one," added Virginia.

"How many want to play 'The First Thanksgiving'? Oh, everyone except Burleson," said Sadie.

"I like parties with lots of ice cream and cookies better than plays," grumbled Burleson.

"Maybe we can have something to eat in our play anyway; let's study the story and be thinking about who'd be best for the parts, so we can begin planning right away," suggested Sadie.

"Fine," they all agreed. "Tomorrow we will make our plans."

II. Planning.

"Oh, goody! Here comes Lester at last!" exclaimed Sadie.

"Hello, Massasoit, you're it," they all exclaimed.

"Yes, we have already decided that you are to be Massasoit because you said you wanted to be and you have that swell Indian suit; besides, we are sure you will play that part just fine," added Sadie.

"Well, I'll try and not spoil the play, I'll do the best I can but I want Robert to wear his Indian suit too," coaxed Lester.

"Sure, I'll wear my suit," replied Robert. "Mother patched it tonight."

"I'd wear mine too if I did not have to say anything," said Edgar.

"Well, Indians don't talk much and I know you can grunt like this, 'Ugh, Ugh,' " explained Lester.

"Gee! Wish I had a suit," complained Lewis.

"So do I," piped up Donald.

"Well, let's see, how many Indians can we have?" inquired Sadie.

"I have already counted the boys," answered James. "There are nineteen and we have already decided that Lester will be Massasoit, Robert and Edgar have Indian suits, so they could be Samoset and Squanto. Lewis, Donald, and some of the other boys can stick feathers in their caps like Indian braves. How many want to be Indians?"

"I do," shouted Jesse, Harry, Sam, Philip, and Paul.

"Let me see, that will be ten Indians and leave nine boys to be Pilgrims," remarked James thoughtfully.

"I think James ought to be Governor Bradford, he is such a good manager," interrupted Luetta.

"Just the thing," agreed Donald.

"I want to be Captain Miles Standish," said Frank. "I don't have an Indian suit but I have a dandy soldier suit and I think daddy will let me carry his big gun."

"My, this is going to be some play," exclaimed Lester.

"Yes, but what are the girls going to act out?" asked Virginia.

"I think Sadie should be Priscilla," said Lester. "She thought of this play; besides I think she is pretty."

"Lester ought to be John Alden if he thinks she is so pretty," laughed Robert.

"My name is John, why can't I be John Alden?" inquired John.

"Sure," exclaimed Lester.

"Say, don't you wish you had taken my part, Captain Miles Standish?" teased John.

"Just wait until you see me with that big gun; you will think I am some captain all right," responded Frank.

"If I knew how to dress like Priscilla did, I would be happy," Sadie remarked.

"Oh, that makes me think of some pictures I brought," exclaimed Louisa. "I brought three pictures showing the first home of the Pilgrims, Governor Bradford and the Pilgrims going to church and another of Priscilla and John Alden."

"I think the girls could wear black dresses with white aprons and caps," suggested Luetta. "My mother will help make the costumes, I know."

"I'm sure my mother will help me too," added Virginia. "She helped me once before."

"We boys won't need to do much to get our costumes ready," bragged George. "Our knee trousers will be right in style, all we will need will be big white collars, buckles for our slippers and stiff hats."

"Let's go home," said Wayne, "and see if our mothers will make these things for us."

"A fine suggestion," said Miss Blanton; "I was just thinking of that myself."

"I wish I knew before I go home whether I can be Mrs. Hopkins or not and bring my big doll and cradle for Oceana," remarked Virginia.

"You spoke first for that part, so it looks like you ought to have it if your mother will let you bring your nice doll," suggested Sadie.

The next day Virginia came to the schoolroom carrying her doll and exclaimed, "Mamma says I can leave my doll with Miss Blanton to take care of it; then we may use it every time we practise."

"Oh, I wish I could bring my doll too," said Clara.

"I have been just wondering why some of the girls couldn't be Indians and tie their dolls on their backs like papooses! I know I would like to," added Emily, enthusiastically.

"So would I," remarked Dorothy and Clara.

"Why of course, let the girls have their dolls if they want to, we boys have our guns," suggested Frank good-naturedly.

"Well, how do you know we are going to have a play?" asked Ann. "We can't have a play without costumes and my mother says she doesn't have any time to fool with such things."

"Don't you think for a minute that we are going to give up this play," exclaimed Sadie, "for that part of it is all fixed; my Aunt Julia said when I told her about our costumes that she would be glad to have something like that to do to keep her from getting lonesome. She will make all the collars, caps, and buckles, if you want her to."

"Let her make them," John shouted.

"But who will make the boys' hats? I want to look big and grand," queried Frank.

"You remember my mother wanted to help make the costumes," replied Luetta. "So I know she will help make the hats if she had one to look at."

"I noticed one in the storeroom the other day," suggested Dorothy. "I think it can be used as a pattern."

"Well, that settles that," said Louisa. "For my mother said she wanted to help too, so I will tell her about the hats to be made."

"I told my mother what I said yesterday, about liking parties better than plays because they always have something good to eat at parties," said Burleson. "Then mother said, 'Why, Burleson, I am ashamed of you; Miss Blanton will think you don't have enough to eat at home.' "

"Well, maybe you are like me, just always hungry," suggested Edgar.

"I think mother knows how a boy feels," answered Burleson, "for she said that Thanksgiving does make one think of good things to eat and she doesn't see why we couldn't have a real Thanksgiving dinner as a part of our play. She told me to ask you if you would like for her to phone the other mothers about furnishing something for the spread."

"Hurrah! Hurrah! A feast," exclaimed John.

"It seems to me that we are forgetting one of the main characters," said thoughtful Ann.

"Oh, I know, it's Elder Brewster," said Chester. "I have been afraid all the time you would want me to take that part, but I want to be Councillor Allerton; I wouldn't like to be a preacher."

"Oh, well, Richard is the one for that part; he is always so serious," suggested Sadie.

"Well, I think you are serious too, smarty," retorted Richard.

"Oh! There, now, Richard, don't feel bad, Sadie didn't mean to hurt your feelings. You must not spoil our play, you are just the one to be Elder Brewster," coaxed Ann; "besides, I'll be Mrs. Brewster if you will be Elder Brewster."

"All right, that's a go," replied Richard.

"Now since we have decided upon the characters and costumes, I think the next thing to do is to plan the scenes and what the characters are to say," suggested Sadie.

"A fine idea," remarked Miss Blanton. "I would like to suggest that Josephine go to the blackboard and write what each character is to say."

"Let's get our pencils and paper, and copy what she writes, so we can learn our parts at home, for that is the part that worries me," remarked Edgar.

Josephine went to the blackboard and Lester was quick to say, "I think the first scene should be Massasoit's Camp and his Indians. I know where I can get a tent and I think it would be fun to make this scene outdoors under the trees; but if it is a bad day we could have our play in the house and bring enough branches in to make it look like a forest."

"Yes, but I dread to say my part," interrupted Edgar.

"Since you dread your part so much, Edgar, you could be first in the play," suggested Lester. "You can pretend like you see something among the trees, make motions and call out, 'Ugh, Ugh.' Then I'll ask if they see white men. Robert could say 'Ugh, Ugh,' too, while we all hide as the Pilgrims come marching in, carrying guns on their shoulders."

"When the Pilgrims stop, Governor Bradford could address them just as the story suggests," added James. "But who will answer the question when I say 'What shall we call this place?' "

"I could answer that. I thought we had learned that Captain John Smith had named the place Plymouth after the old Plymouth in England," explained John.

"We'll all exclaim, 'Yes, yes, it must be Plymouth,' " continued James. "I'll tell the men to get to work building log cabins. Just then the Indians could slip out from behind the trees and I'll call out, 'Who comes there?' "

"We'll all scream, 'Indians!' " suggested Dorothy.

"Right then I'll take a hand," chuckled Frank. "I'll step to the front, point my gun at the Indians and say, 'What do you want?' "

"Massasoit could then walk up to you and say, 'Me welcome you strangers,' " remarked Lester.

"My, that does sound babyish," laughed Lewis.

"No, it doesn't either," retorted Virginia. "That is just the way Indians talk."

"We'll stop fussing," warned Frank. "I want to tell you what I'm going to do. I'll drop my gun to my side and exclaim, 'Oh, they are friends.' Then I'll walk up to Massasoit, shake hands with him and say, 'Welcome, red men, we are Pilgrims come to live with you away from a cruel king'; after this I'll introduce James as Governor Bradford."

"Massasoit will introduce himself," explained Lester, "by saying, 'me Massasoit, Indian Chief,' and pointing to others say, 'him Squanto, him Samoset and Indian braves.' "

"We must not forget about the Indians teaching the white men to raise corn," declared Sadie.

"I was thinking of that," replied Lester. "How would it do for me to say, 'You plant corn, me show how.' Then I'll swing my arm like I am sowing grain; next I'll raise my hand high and say, 'Corn big, eat.' "

"Gee! He's some actor!" said Lewis proudly.

"I'll tell you something else that would be fun," continued Lester. "I would like to walk up to Virginia's doll (the girls could act like they were frightened), pat it on the head and say, 'White papoose, me no kill.' "

"Oh, that's great," exclaimed Virginia. "We'll say, 'Good Massasoit! Good Massasoit!' And that's a good ending for the first scene, I think."

"So it is," agreed Miss Blanton. "I am very much pleased with the first scene. I think you are going to have a wonderful little play."

"I wish we could have the second scene in Mrs. Hopkins' home," suggested Sadie. "We learned that this first Thanksgiving was a year after the Pilgrims landed; by that time they had their homes built and some furniture. So Mrs. Hopkins could be seated rocking Oceana in her cradle. That would be interesting."

"Oh, Sadie, that will be splendid," bragged Virginia. "Louisa, Luetta and you can come and knock; I will go to the door and say, 'How do you do, my dear friends and neighbors, come in and have seats.' "

"My! This is just like playing 'Come to see,' " declared Luetta.

"I'll ask how little Oceana is today," remarked Sadie.

"I'll bet you'll laugh, Sadie," teased Robert.

"I'll bet she doesn't," retorted Virginia. "You think girls can't do anything. I'll tell Sadie that Oceana is strong and well and I will add that I am thankful to say so because this play is about Thanksgiving, you know."

"Yes, that is right," added Louisa. "I thought I would say, 'Oh, we have so much to be thankful for, we have been saved from starvation and kept safe from great dangers.' Then I'll turn to Virginia and ask her if she has heard that we are going to spend the next day giving thanks. Of course Virginia will say she hasn't heard a thing about it."

"No, I won't either," retorted Virginia. "You know the Pilgrims always went to church, so I'd rather say, 'Yes, I heard about it at church last Sunday, but I've been home so closely with Oceana I have not heard their latest plans.' "

"I will explain to her," suggested Sadie, "that I heard John Alden and Miles Standish say we were to meet in the meadow Thursday at noon and have dinner together, sing songs and offer prayers of Thanksgiving."

"Captain Standish, Governor Bradford and Councillor Allerton have already gone to invite our friends Massasoit and his tribe to dinner," added Luetta.

"That suits me, talk up the dinner," called out Burleson.

"Everyone has something to say except me; I don't see where I come in, in this play," pouted Ann.

"Now, Mrs. Brewster, don't get peeved," teased Robert.

"Oh, I know, wouldn't it be fun to have Elder and Mrs. Brewster call on Mrs. Hopkins while we're there," suggested Luetta.

"Just the thing!" shouted James.

"I'll say, 'Here come Elder and Mrs. Brewster,' " added Virginia. "Then I'll go to the door and they will come in, acting very dignified."

"After we say, 'How do you do?' what will we talk about?" inquired Luetta.

"Of course we'll talk about the Thanksgiving dinner," answered Ann. "And then I'll ask Virginia if she can help cook and serve the dinner."

"Virginia can't help," laughed Lester. "She'll have to take care of Oceana."

"No, sir, I'm going to that dinner," declared Virginia. "Lots of ladies go places and take their babies with them; that's what I'll do."

"I think Elder Brewster ought to make a talk about

Thanksgiving before he leaves Mrs. Hopkins," suggested Louisa. "Then I'll jump up and say, 'I must go.' "

"Yes, we'll all leave when my husband gets through talking," laughed Ann. "And I'll call out from the front door step, 'Come early, Mrs. Hopkins, for all the women of the village will prepare the dinner out in the meadow.' "

"I'll answer by saying, 'Yes, I'll be there,' " said Virginia.

"This would be a good place for the curtain to fall," remarked Ann.

"Just the place," agreed Lester.

"Now comes the best part of the play," exclaimed Burleson. "My mother phoned all the mothers and they seemed glad to furnish something for the dinner, so we won't have to just pretend like we are eating."

"We must pretend, though," suggested Sadie, "that we cook the dinner. The girls could be busy setting the table while the boys chop the wood."

"I chop nearly all the wood at home," bragged Robert. "I'll bring my ax and show you how it is done."

"My plan is to rush in with a bag on my shoulder, throw it down at Priscilla's feet and say, 'Here are the turkeys for dinner, Priscilla. They are the largest I could find in the woods. Cook them well, they will make a feast,' " remarked Frank.

"Say, boy, but this is getting interesting," piped up Edgar.

"I thought I was going to be in this play and have my dolly like Virginia," interrupted Dorothy.

"Don't you remember, Dorothy, you and Clara and I are going to strap our dolls on our backs like papooses," explained Emily.

"I'm getting anxious to see all my tribe together," remarked Lester.

"I'll count them for you," suggested Robert, "there's Edgar, Jesse, Lewis, Harry, Donald, Philip, Sam, and myself and the three girls, Emily, Clara and Dorothy."

"Gee! We'll make quite a show when we go marching in to dinner," said Lester proudly.

"I've seen several pictures of Indians and white men sitting in a circle smoking a peace pipe. I wish we could have something like that in our play," suggested Sadie.

"That would be easy if we just had a pipe," remarked Sam.

"Let me bring the pipe," said Philip. "We have one that Uncle Joe sent from China. It will be just the thing. I know I can get it."

"When Massasoit and his tribe come to dinner," remarked James, "I'll walk up to Massasoit, make a big bow, welcome each one and make a grand speech of some sort; then I'll say: 'John Alden, bring the peace pipe'; then we'll all sit down in a circle and smoke in turn but not say anything.

"Who is going to tell them when dinner is ready?" inquired Sadie.

"You are the one to do that, Sadie," answered Lester. "Be sure you make a bow when you do and look your prettiest."

"Oh, that will be easy for Sadie," said Chester shyly.

"Since I am Governor Bradford," remarked James, "I'll get up, motion with my hand and say, 'Come Massasoit. Come braves. Come all.' "

"Whoopee-ee! Now we'll eat," shouted Richard.

"That's just like boys, they don't have any manners," declared Louisa. "I think Governor Bradford should sit at the head of the table, then the Pilgrim men and women and next the Indian tribe."

"Yes, and I think Governor Bradford ought to ask Elder Brewster to ask the blessing," suggested Jesse.

"How about it, Richard, will you do it?" asked Ann coaxingly.

"Well, I could say the one we learned at Sunday School if it would be all right," answered Richard.

"I think everyone should bow their heads while the blessing is being asked," remarked Louisa. "After that we can laugh and talk about anything we want to."

"I wish we could sing one of our songs," suggested Sadie.

"Let's have Elder Brewster stand and make a sign for all the others to stand; then we'll sing a psalm and be seated again," said James.

"All right," laughed Richard. "I guess I'll have to do what the Governor says."

"Gee! I'm glad you are going to be seated again. I was afraid you would forget the pumpkin pies," remarked Chester.

"Oh! I'll get the pie," suggested Sadie.

"Well, I'll have to help you, for you can't carry them all," laughed John.

"Three cheers for John," they shouted.

III. Executing:

Scene I. Camp of Massasoit and his Indians.
Scene II. The Home of Mrs. Hopkins a year later.
Scene III. The Meadow before the Village of Plymouth.

CHARACTERS

Squanto	Edgar
Massasoit	Lester
Samoset.	Robert
Governor Bradford	James
Captain Standish	Frank
Councillor Allerton	John
Madame Hopkins	Virginia
John Alden	Chester
Mrs. Brewster	Sadie
Priscilla	Luetta
Mrs. Allerton	Louisa
Mrs. Winslow	Ann
Elder Brewster	Richard
Pilgrim Men	Burleson George Wayne Carl
Indian Braves	Jesse Lewis Harry Donald Philip Sam Paul
Pilgrim Women	Josephine Hazel Ruth Mary Fanny
Indian Women	Clara Dorothy Emily

Scene I: Camp of Massasoit and his Indians in the forest. Massasoit welcomes the Pilgrims.

Squanto (Sees something among the trees, beckons and calls): Ugh! Ugh!

Massasoit: White men?

Samoset: Ugh! Ugh!

Massasoit: Sh! (They hide. Pilgrims walk in slowly, the men with guns looking cautiously about. They halt.)

Gov. Bradford: My friends, after three months of sailing on our good ship the *Mayflower,* we have at last reached the new land of America. Here we can worship God in our own way with no king to say how we shall do it. But we must have a name for this place. What shall we call it?

John Alden: Governor Bradford, this must be the place that Captain John Smith told us he had named Plymouth after the old Plymouth in England.

Gov. Bradford: Then Plymouth it shall be. But we can't stand here talking. We have work to do. First we must build two log cabins, one for the women and one for the men. (The Indians come out from behind the trees.) Who are these?

All: Indians! (Captain Miles Standish steps in front with gun pointed. The other men make circle with the women in the center.)

Captain Standish: What do you want?

Massasoit: Me welcome you strangers.

Captain Standish (Dropping gun to side)*:* Oh! They are friends! (Goes to meet them.) Welcome, red men. We are Pilgrims come to live in your land away from a cruel king. This is our Governor Bradford. I am Captain Miles Standish.

Massasoit: Me Massasoit, Indian Chief. (Points.) Him Squanto, him Samoset, Indian braves.

Braves: Ugh! Ugh!

Massasoit: You plant corn? Me show how. (Swings arm as in sowing grain.) Corn big. (Raises hand to level of growth.) Eat.

Captain Standish: He says he will show us how to plant corn to eat.

Pilgrims: Hurrah! Hurrah!

Massasoit (Walks over to baby Oceana, the women fall back afraid. Massasoit pats baby on head): White papoose! Me no kill.

Pilgrims: Good Massasoit! Good Massasoit!

Curtain.

Scene II: A year later. A room in the home of Madame Hopkins. Madame Hopkins seated in a low chair rocking the cradle of little Oceana. There is a knock at the door.

Madame Hopkins (Rising): Come in. (Enter Priscilla, Mrs. Allerton and Mrs. Winslow.)

Madame Hopkins: How do you do? Dear friends and neighbors, come in and have seats.

Priscilla: Thank you, Madame Hopkins. How is little Oceana today?

Madame Hopkins: She is strong and well, I am thankful to say.

Mrs. Winslow: Oh, we have so much to be thankful for. We have been saved from starvation and kept safe from great dangers. Have you heard that we are going to spend the day tomorrow in Thanksgiving?

Madame Hopkins: Yes, I heard the announcement made at church last Sunday, but I have scarcely been outside since then. Can you tell me the final plans for this Thanksgiving?

Priscilla: I heard John Alden and Miles Standish say that we are all to meet in the meadow Thursday at noon and have dinner together, sing songs and offer prayers of Thanksgiving. Captain Standish, Governor Bradford and Councillor Allerton have gone to invite our friend Massasoit and his tribe to dinner.

Madame Hopkins: Here come Elder and Mrs. Brewster now. (Madame Hopkins hastens to open the door. Enter Elder and Mrs. Brewster.)

Both: Good day to you all.

All (within): Good day to you.

Madame Hopkins: We were talking about Thanksgiving.

Mrs. Brewster: And may we count on you, Madame Hopkins, to help us cook and serve the dinner tomorrow?

Madame Hopkins: Indeed, you may.

Elder Brewster: That is indeed the right spirit. All the colonists seem to have the right spirit and it is my wish that this observation of a day of giving thanks to God may be passed on to our children and to their children so that we may ever be a nation that does not forget the Heavenly Father.

Mrs. Winslow: Well, I must go.

Madame Hopkins: Good day, my dear friends.

All: Farewell, until tomorrow.

Mrs. Brewster (From the door step): Come early to the meadow, Mrs. Hopkins, for all the women of the village will prepare the dinner there.

Madame Hopkins: I'll be there.

Curtain.

Scene III: The meadow before the village of Plymouth. The women of the village are hurrying about bringing food and preparing the table. The men are chopping wood. Captain Standish comes from the woods with a big gun over his shoulder.

Captain Standish: Priscilla! Here are the turkeys for dinner. They are the largest I could find in the woods. Cook them well. They will make a fine feast. (Priscilla courtesies and takes the turkeys. The Indians come filing in; the Pilgrim men meet them.)

Gov. Bradford: Welcome, Massasoit! (He bows with great ceremony as he welcomes each one.) Welcome, Squanto! Welcome, Samoset! Welcome, braves! We have asked you to come to our feast of Thanksgiving today. God has given us fine fields of corn and good fruit. He has kept us safe and we wish to thank Him for all He has done for us.

(John Alden brings the peace pipe. All sit in a circle on the ground and smoke in turn the peace pipe, a few minutes in silence.)

Priscilla (Courtesying): Governor Bradford, dinner is ready.

Gov. Bradford: Elder Brewster, will you ask the blessing?

Elder Brewster (Making a sign for all to bow their heads): Our Father, we thank Thee for this food, for our health, for freedom to worship Thee in our own way. For all of our great blessings we truly thank Thee. Amen. (The dinner proceeds merrily amid laughter and talk, until at a sign from Elder Brewster all stand and sing a psalm. They are reseated.)

Priscilla (Rising): I will bring the pie.

John Alden: I will help you. (Exit Priscilla and John. Others laugh and talk.)

Curtain

IV. Judging:

"Oh, Miss Blanton, I have something the best to tell you. Mamma said our play was the best she ever saw put on in the school."

"That's perfectly splendid," agreed Miss Blanton.

"Well, I saw something that I didn't think was very nice," remarked Louisa.

"Oh, you mean the funny faces that Robert made while he was partly hid from the Pilgrims, don't you?" inquired Ann.

"No, I didn't see that," said Louisa, "but I saw some one, I won't say who, that laughed while Elder Brewster was asking the blessing."

"I'm sure it wasn't I," announced Lester, "for I got sent away from the table once when the minister was at our house; he asked such a long blessing my grandfather nodded and of course I laughed."

"Well, I know everyone liked our play," said Virginia, "and my mother said, 'I like that sort of a play because it helps you so much to find out about the Pilgrims.' "

"I wish we could play Columbus next, for we know so much about him already," suggested Luetta.

"Hurrah! That suits me," interrupted Lester. "There would be more Indians in that play and I just love to be an Indian."

"You make a splendid Indian, Lester, but what parts could the girls take in the play Columbus?" asked Sadie.

"Oh, we could think it out," replied Lester. "You'd make a dandy Queen Isabella, Sadie."

"Thanks, awfully," responded Sadie.

"Who is Queen Isabella?" inquired John.

"Why, John, don't you know that she was the Queen of Spain?" answered James with importance.

"I could take the part of King Ferdinand, if you want me to," suggested James.

"Huh!" exclaimed Robert. "He thinks he's some actor."

"Well, Miss Blanton, my mamma told me that we had some splendid talent in our room," explained Ann. "And I think she must have meant Sadie and James."

"At any rate I mean to be a great actor when I grow up," bragged James.

"So do I," echoed a dozen voices.

V. Leading on Activities:

1. How to play Columbus.

V. *How Bobby Adds His Roly Poly Scores*

(Skill Activity)

I. Purposing:

"Miss Burke, won't you show me how to add my Roly Poly scores?" queried Bobby at the end of a Roly Poly game. "I lost the game because I made a mistake,—see?"

"Sure," replied Miss Burke. "When would you like for me to help you?"

"This afternoon at the Skill Activity period," explained Bobby. "I'd like to learn how to add so I'll make no more mistakes."

"All right, Bobby, I'll help you this afternoon," agreed Miss Burke.

"I'll bring my score book," interrupted Bobby. "And my pencil too."

II. Planning:

"Just look at my Roly Poly scores, Miss Burke," insisted Bobby, at the Skill Activity period. "I have a whole book of them."

"Well, I think so, Bobby," replied Miss Burke. "I didn't know you had played that many games."

"Oh, I haven't at school," explained Bobby. "I played some at home. My mamma bought me some Roly Polys."

"I guess that's why you are such a good player," interrupted Miss Burke. "I noticed you made next to the highest score today."

"I made the highest score," broke in Bobby. "I made a mistake in adding my scores is why I made second place."

"Well, that was too bad," sympathized Miss Burke. "I guess that's why you want to learn how to add."

"Sure," exclaimed Bobby. "I don't want to make that mistake again."

"I see," agreed Miss Burke. "What is that other book you have, Bobby?"

"Oh, that's John's Score Book," explained Bobby. "I thought if I could learn to add his scores without making a mistake, I'd be all right."

"John is quite a good player," agreed Miss Burke. "He has some big scores too, I see."

"Gee, I wish I could add them without making a mistake," insisted Bobby. "I want to add mine first, though."

"All right, Bobby, how long do you want to practise adding your scores?" questioned Miss Burke. "I'm sure you'll soon learn how to add without making mistakes."

"I don't know how long I'll spend adding my scores," replied Bobby. "John told me he practised on his until he could add them three times without making a mistake."

"Oh, yes," interrupted Miss Burke. "I remember now helping John."

"I believe I'll do that too," continued Bobby. "I'll just keep adding my scores until I can add them three times without making a mistake."

"That's a very good plan," explained Miss Burke. "I don't see how?"

"I know, I know," interrupted Bobby. "I'll just keep adding the scores for one game until I can add them three times without making a mistake."

"All right, Bobby," agreed Miss Burke. "Do you plan to add John's in the same way?"

"Sure," explained Bobby. "I want to learn how to add big scores too. I'm going to make some next time."

"You'll need some paper, won't you, Bobby?" queried Miss Burke. "Oh, I beg your pardon, I see you have your tablet."

"And my pencil, too," added Bobby. "I'll place my paper right under the scores and add on it like this." He illustrates.

"Oh, I see," remarked Miss Burke.

"And when I add the scores for one game right three times, I'll begin on another," continued Billy. "I'll do John's the same way."

"I believe that's a good plan," agreed Miss Burke. "I hadn't thought of that."

III. Execution:

Bobby practised adding the Roly Poly scores recorded in his and John's Game Book until he could add the scores for each game without making a mistake. Miss Burke assisted him in using the best method in adding.

IV. Judging:

"Now, Miss Burke, just watch me add these Roly Poly scores," remarked Bobby near the close of his second day of practise. "I can add now without making mistakes."

"That's fine, Bobby," approved Miss Burke. "Suppose you try these."

"Sure," agreed Bobby. "Watch me add them three times without making a mistake."

"You'll not lose the next game, will you, Bobby?" interrupted Miss Burke. "You're a champion now."

"I'll sure not," enthused Bobby. "I made my mistakes in carrying."

"I see," added Miss Burke.

"I'm going to add my Roly Poly scores from now on three times," continued Bobby. "I know I'll get them right then."

"That's a very good idea, Bobby," approved Miss Burke. "I noticed John always adds his scores twice."

"And he never makes a mistake, either," added Bobby. "I'm going to add mine three times, though."

"All right, Bobby," agreed Miss Burke.

"Gee, I can't hardly wait until the next Roly Poly game," interrupted Bobby. "I want to try my luck adding some new scores."

"Maybe you'll not play Roly Poly," remarked Miss Burke. "I heard Catherine say she wanted to play Bean Bag."

"Well, I'll add my Bean Bag scores then," continued Bobby. "I'm for Roly Poly though."

V. Leading on Activities:

1. How Billie added his Bean Bag scores, the game selected on succeeding day.

CHAPTER XIV

GUIDANCE OF PURPOSIVE BEHAVIOR

1. Conditions of Purposive Behavior. Purposive behavior is, as we have seen, the response of boys and girls in the direction of their drive in the initiation, evaluation, and choice of goal; initiation, evaluation, and choice of means; execution of means; and initiation, evaluation, choice, and consummation of improvement. It depends, as such, upon two primary conditions. In the first place, purposive behavior depends upon setting up action in the stimulus-response mechanisms included in the traits. It depends in this sense upon stimulation for action is set up in the stimulus-response mechanisms of a trait through appropriate stimuli acting upon their receiving ends. The first condition of purposive behavior is, therefore, stimulation of the response of boys and girls along their drive in the several traits. In the second place, purposive behavior depends upon successful action of the stimulus-response mechanisms included in the traits. It depends in this sense upon direction of action of the mechanisms over any obstruction arising out of their functioning. The second condition of purposive behavior is, therefore, direction of the response of boys and girls along their drive in the several traits of purposive behavior. Stimulation and direction are in this sense the primary conditions of purposive behavior.

2. Rôle of Guidance in Purposive Behavior. Purposive behavior depends, as we have seen, upon two primary conditions. It depends, in the first place, upon stimulation of response along drive in its traits, and in the second place, upon direction of response along drive in these traits. Guidance is providing these conditions. It is along two lines. In the first place, guidance provides stimulation of the response of boys and girls along the lines of their drive in the initiation, evaluation, and choice of goal; initiation, evaluation, and choice of means; execution of means; and initiation, evaluation, choice, and consummation of improvement. It provides stimuli capable of stimulating the response of boys and girls along their drive in each of these traits. In the second place, guidance provides direction of the response of boys and girls along their drive in the face of difficulties in the initiation, evaluation, and choice of goal; initiation, evaluation, and choice of means; execution of means; and initiation, evaluation, choice, and consummation of improvement. It sees that success attends the response of boys and girls along their drive in each of the several traits. Guidance is in this sense stimulation and direction of purposive behavior.

3. Rôle of Guidance in Growth. Guidance is fundamental for at least two reasons. In the first place, purposive behavior depends upon stimuli capable of stimulating the response of boys and girls along their drive in the initiation, evaluation, and choice of goal; initiation, evaluation, and choice of means; execution of means; initiation, evaluation, choice, and consummation of improvement. Guidance provides such stimuli and, for this reason, is fundamental in purposive behavior. Without guidance in this particular purposive behavior would be thwarted in many instances, for it depends in every instance upon stimulation of the response of boys and girls along their drive in the initiation, evaluation, and choice of goal; initiation, evaluation, and choice of means; execution of means; initiation, evaluation, choice, and consummation of improvement. In the second place, purposive behavior depends upon direction of the response of boys and girls along their drive over obstructions arising along the initiation, evaluation, and choice of goal; initiation, evaluation, and choice of means; execution of means; and initiation, evaluation, choice, and consummation of improvement. Guidance provides such direction. It sees that success attends the response of boys and girls along their drive in each of these traits and is, for this reason, fundamental in purposive behavior. Without guidance in this particular, the response of boys and girls along their drive would be thwarted in many instances as a result of difficulties and consequently purposive behavior would be thwarted for it depends in every instance upon successful response of boys and girls along their drive in the initiation, evaluation, and choice of goal; initiation, evaluation, and choice of means; execution of means; initiation, evaluation, choice, and consummation of improvement. Guidance through stimulation and direction, thus, is basic in growth for the growth of boys and girls takes place, as we have seen, in and through purposive behavior.

4. **Rôle of Guidance in Teaching.** There are three points considered in this discussion that shed light on the nature of teaching. The first point is the nature of education itself. Education is, as we have seen, continuous change in the purposive behavior of boys and girls. It is continuous change in the drives and responses of boys and girls along the initiation, evaluation, and choice of goal; initia-

tion, evaluation, and choice of means; execution of means; and initiation, evaluation, choice, and consummation of improvement. This point indicates the function of teaching. It indicates the teacher's function is to further the continuous changes in the purposive behavior of boys and girls since the teacher's job is the education of boys and girls. The second point is how education takes place. Growth of boys and girls takes place, as we have seen, through purposive behavior. It takes place through the response of boys and girls along their drive in the initiation, evaluation, and choice of goal; initiation, evaluation, and choice of means; execution of means; initiation, evaluation, choice, and consummation of improvement. This point indicates that the teacher achieves her function through the purposive behavior of boys and girls. The third point is the conditions of purposive behavior. Purposive behavior depends, as we have seen, upon guidance. It depends upon stimulation and direction of the response of boys and girls along the lines of their drive in its traits. This point indicates how teaching takes place. It indicates that teaching takes place through guidance since the teacher achieves her function through boys and girls engaging in purposive behavior. Since guidance is along two lines, teaching is along two lines. It involves, in the first place, guidance through stimulation of purposive behavior. The teacher provides, in this sense, stimuli capable of stimulating the response of boys and girls along their drive in the initiation, evaluation, and choice of goal; initiation, evaluation, and choice of means; execution of means; initiation, evaluation, choice and consummation of improvement. In the second place, it involves guidance through direction of purposive behavior. The teacher enables boys and girls to respond successfully along their drive in the face of difficulties in the initiation, evaluation, and choice of goal; initiation, evaluation, and choice of means; execution of means; initiation, evaluation, choice, and consummation of improvements. She sees, in other words, that success attends the response of boys and girls along their drive in each of these traits. Teaching, in brief, is through guidance for stimulation and direction are the component elements of guidance. It is guidance of the purposive behavior of boys and girls.

5. Guidance Through Stimulation of Purposive Behavior. Guidance in this particular involves, as we have seen, stimulation of the response of boys and girls along the line of their drive in the initiation, evaluation, and choice of goal; initiation, evaluation, and choice of means; execution of means; initiation, evaluation, choice, and consummation of improvement. It is through the teacher providing stimuli capable of stimulating the response along the line of their drive in each of these traits.

There are two points that shed light on the nature of such stimuli. The first point is the individual differences of boys and girls. No two boys or girls are alike in any respect. They differ in some degree in everything. They differ in height, weight, color of eyes, muscular speed—in fact, in all physical traits. The same is equally true in case of the traits of purposive behavior. No two boys or girls inherit identical systems of stimulus-response mechanisms. Their stimulus-response mechanisms differ widely in number, aggregation, and modifiability, and for this reason purposive behavior is varied among boys and girls, since it involves, in every instance, the action of an aggregate of mechanisms. Since purposive behavior varies among boys and girls as a result of differences in their stimulus-response mechanisms, stimulation necessarily varies for it involves, in every instance, stimulation of the response of each individual boy or girl along the lines of drive in the traits of purposive behavior. This demands varied stimuli since stimulation of purposive behavior takes place through stimuli in every case. The second point is response of children's stimulus-response mechanisms along their drive. Growth of boys and girls takes place, as we have seen, in and through response of their stimulus-response mechanisms along their drive. This demands stimulation of the response of boys and girls along the line of his or her drive in the traits of purposive behavior. It demands, in every instance, stimuli capable of stimulating the response of each individual boy and girl along the line of his or her drive in the initiation, evaluation, and choice of goal; initiation, evaluation, and choice of means; execution of means; initiation, evaluation, choice, and consummation of improvement. Guidance through stimulation of purposive behavior demands, in this sense, the teacher provide varied stimuli along the traits of purposive behavior.

6. **Guidance Through Direction of Purposive Behavior.** Guidance in this particular involves, as we have seen, direction of the response of boys and girls along their drive in the face of difficulties in the initiation, evaluation, and choice of goal; initiation, evaluation, and choice of means; execution of means; initiation, evaluation, choice, and consummation of improvement. It demands that the teacher see that success attends the response of boys and girls along their drive in each of these traits. It demands, for example, that the teacher enable boys and girls to respond successfully along their drive in the face of a difficulty in

the initiation of means, say, difficulty in finding a suitable design for making a flower vase. Direction, in this sense, is equally demanded of the teacher in enabling boys and girls to respond successfully along their drive in the face of difficulties in all the other traits of purposive behavior, as, for example, enabling a boy to overcome a difficulty in the execution of a particular mean, say, difficulty in drawing the design on the bottle in making a flower vase. Direction of purposive behavior, in this sense, is, in every instance, enabling boys and girls to respond successfully along their drive in the face of difficulties arising along the initiation, evaluation, and choice of goal; initiation, evaluation, and choice of means; execution of means; initiation, evaluation, choice, and consummation of improvement. It is, in this sense, varied. In one case, it may be the teacher enabling a boy to respond successfully along his drive in the face of a difficulty in the initiation of a goal, say, in stories; in another case, it may be the teacher enabling another to respond successfully along his drive in the face of a difficulty in the evaluation of a particular mean, say, difficulty in pointing out advantages and disadvantages between a clover leaf and a butterfly design for making a flower vase; still in another case, it may be the teacher enabling a boy to respond successfully along his drive in the face of a difficulty in the execution of means, say, difficulty in drawing the design on the bottle in making the flower vase—in fact, direction is along each and all the traits of purposive behavior for each individual boy and girl. And this is guidance through direction of purposive behavior.

7. **Lines of Guidance.** Purposive behavior involves, as we have seen, action of interrelated aggregates of stimulus-

response mechanisms along a particular line. These aggregates are the purposing mechanisms, the planning mechanisms, the executing mechanisms, and the judging mechanisms. Guidance is along these lines, for, as we have seen, guidance involves the stimulation and direction of the purposive behavior of boys and girls. It involves in particular guidance in purposing, guidance in planning, guidance in execution, and guidance in judging. The nature of guidance along each of these lines is treated fully in succeeding chapters.

8. **Conventional Teaching.** This interpretation of teaching has nothing in common with conventional teaching. One considers boys and girls doers, the other considers boys and girls receivers; one considers learning as changes in conduct along the traits of purposeful activity, the other considers learning as absorption of facts along the conventional school subjects; one enhances individual differences, the other evens up such differences; one frees the responses of boys and girls; the other enslaves the responses of boys and girls; one aids, the other draws out; one teaches boys and girls; the other teaches subjects—in brief, one guides, the other pumps.

These differences in teaching are due to differences in the interpretation of education. Teaching through guidance is founded upon education as continuous growth of boys and girls. Such an education demands guidance for growth, in every instance, depends upon stimulation and direction of the response of boys and girls along their drive in the initiation, evaluation, and choice of goal; initiation, evaluation, and choice of means; execution of means; initiation, evaluation, choice, and consummation of improvement. Teaching in accordance with this interpretation provides such guidance. It stimulates and directs purposive behavior. The school thus is a doing place—a laboratory. On the other hand teaching through pumping is founded upon education as the absorption of facts represented by the conventional school subjects. Such an education demands prescription of certain facts for boys and girls to absorb in study, drawing these facts out at the class recitation, and testing their ability to hold "in store" these facts over stated intervals. Teaching in accordance with this interpretation provides such prescription, drawing out, and testing. The school is truly a pumping station—a place for the teacher to draw out prescribed facts!

These differences in teaching are fraught with significance. They are thus for at least one fundamental reason. Boys and girls do not grow through pumping—through drawing out prescribed facts. They grow, on the other hand, through doing—through purposive behavior. If the teacher has as her objective the teaching of the conventional subjects, she will necessarily follow the pumping procedure; if, on the other hand, she has as her objective, the teaching of boys and girls she will necessarily follow the guidance procedure. In one case she will thwart and prohibit the growth of boys and girls; in the other she will stimulate and direct the growth of boys and girls.

CHAPTER XV

NATURE OF GUIDANCE IN SUCCESSFUL PURPOSING

1. Pupil Purposing. Purposive behavior contemplates pupil purposing in every instance. It does for at least two reasons. First, purposive behavior involves, as we have seen, the functioning of a series of interrelated stimulus-response mechanisms along a particular line. Purposing is the functioning of one of these series of stimulus-response mechanisms and, as such, involves the response of boys and girls along their drive in this particular, for stimulus-response mechanisms function in this fashion. Pupil purposing is, in this sense, one of the earmarks of purposive behavior. Second, purposing is one of the lines of growth. Growth of boys and girls in this particular involves, as we have seen, change in drive and response and it takes place through boys and girls responding along their drive in purposing. It is in this manner that boys and girls grow in purposing—in choosing more wisely. Pupil purposing is, in this sense, the key to growth in this particular of conduct. Such growth is desirable for the success of an individual in a democracy depends very largely upon wise purposing. If the teacher does the purposing growth in this particular is thwarted. The resultant change is in the teacher's drive and response since it is her stimulus-response mechanisms that function. Teacher purposing blocks, in this sense, the functioning of the stimulus-response mechanisms of boys and girls along this line and, in so doing, prohibits growth in purposing. Pupil purposing thus is fundamental in purposive behavior and growth. Without it purposive behavior, on the one hand, is thwarted, and, on the other hand, growth of boys and girls in purposing is blocked.

2. Procedure in Pupil Purposing. Purposing includes, as we have seen, three interrelated steps. First, it involves initiation of goal. This includes boys and girls suggesting goals to pursue. Sadie's suggestion to dramatize the First Thanksgiving story is an instance.[1] Second, it involves evaluation of goals. This includes discussion of the desirability and practicability of the suggested goals. Louisa's explanation that the First Thanksgiving story would be suitable for boys but unsuitable for girls, is an example. Third, it involves choice of goal. This involves preference for or against a particular suggested goal. Virginia's decision to dramatize the First Thanksgiving story is an illustration. The procedure of purposing involves, in this sense, three interrelated steps. It involves in the first place, initiation of goal, in the second place, evaluation of goal, and in the third place, choice of goal. The functioning of each of these steps in this order constitutes the procedure of pupil purposing.

3. Successful Pupil Purposing. Purposing involves, as we have seen, the initiation of goal, evaluation of goal, and choice of goal. These are the traits of purposing. The functioning of each trait includes response along drive for the stimulus-response mechanisms involved function in this fashion. The functioning of initiation of goal, for example, involves boys and girls responding along their drive to suggesting goals to pursue. The same is equally true of the other traits of purposing. Successful purposing is, in this sense, boys and girls responding along their drive consecutively in the initiation of goal, evaluation of goal, and choice of goal. It is boys and girls themselves initiating, evaluating, and choosing a goal to pursue.

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[1] For an account of this activity, see Chapter XIII.

4. **Guidance in Pupil Purposing.** Pupil purposing involves, as we have seen, response along drive in the initiation, evaluation, and choice of goal, and, as such, involves guidance for response along drive depends upon stimulation and direction. Guidance in purposing is, in this sense, along two lines. In the first place, it provides stimulation of the response of boys and girls along their drive in the initiation, evaluation, and choice of goal. It provides stimuli capable of arousing the response of boys and girls along their drive in each of these traits of purposing. In the second place, it provides direction of the response of boys and girls along their drive in the initiation, evaluation, and choice of goal. It sees that success attends pupil response in each of these steps. Guidance, in this particular, is stimulation and direction of pupil purposing.

5. **Guidance and Growth in Purposing.** Guidance is fundamental for at least two reasons. First, purposing depends upon stimuli capable of arousing the response of boys and girls along their drive in the initiation, evaluation, and choice of goal. Guidance provides such stimuli and for this reason is fundamental in pupil purposing. In the second place, purposing depends upon direction of pupil response along their drive in the initiation, evaluation, and choice of goal. Guidance provides such direction. It sees that success attends the response of boys and girls along their drive in each of these steps and is for this reason

fundamental in pupil purposing. Guidance, in this sense, is basic in pupil purposing, for without it pupil purposing would be thwarted in many instances. Successful pupil purposing constitutes in every case a teacher for the function of the teacher is, as we have seen, to afford boys and girls guidance in purposing. Guidance is, in this sense, fundamental in growth of boys and girls in purposing, for growth takes place along this line through the response of pupils along their line in the initiation, evaluation, and choice of goals to pursue.

6. **Stimulation of Pupil Purposing.** Guidance in this particular involves, as we have seen, stimulation of pupil response along their drive in the initiation, evaluation, and choice of goals. It takes place through the teacher providing stimuli capable of arousing the response of boys and girls along their drive in these steps. There are two points that should guide the teacher in providing such stimuli. The first point is the law of individual differences. No two boys or girls are alike in any respect. They differ in some degree in everything. Their stimulus-response mechanisms differ widely in number, organization, and modifiability and for this reason pupil purposing varies, since it involves, in every instance, the functioning of stimulus-response mechanisms. Since purposing varies as a result of differences in stimulus-response mechanisms, stimulation necessarily varies for it involves, in every case, stimulation of each pupil's response along its drive in the initiation, evaluation, and choice of goal. This demands varied stimuli since purposing depends, in every instance, upon stimuli capable of arousing responses of boys and girls along their drive in the initiation, evaluation, and choice of goal.

The second point is the lines of purposive behavior. The stimulus-response mechanisms of boys and girls act, as we have seen, along five major lines. The first line involves action of stimulus-response mechanisms in constructing things; the second line involves action of mechanisms in communicating things; the third line of action involves finding out things; the fourth line involves action of mechanisms in competing in things; and the fifth line involves action of mechanisms in perfecting things. There are, in this sense, five lines of stimulation in pupil purposing. The first line of stimuli involves a workshop with tools and materials for construction in wood, metal, textiles, clay, paper, yarn, leather, cardboard, raffia, reed, paint, crayola, foods, and type for such stimuli stimulate pupil response along their drive in the initiation, evaluation, and choice of goals in constructing things. A second line of stimuli involves stories in reading, music, dramatizations, song, and pictures, for such stimuli arouse pupil response along their drive in the initiation, evaluation, and choice of goal in communicating things. A third line of stimuli involves occupations and natural phenomena of community life, such as industries, occupations, animal life, plant life, and earth and sky, for such stimuli arouse pupil response along their drive in the initiation, evaluation, and choice of goal in finding out things. A fourth line of stimuli involves playground and gymnasiums equipped with apparatus for indoor and outdoor games and contests for such stimuli arouse pupil response along their drive in the initiation, evaluation, and choice of goal in competing in things. A fifth line of stimuli involves equipment for practise in handwriting, sewing, dancing, typewriting, language, debating, for such stimuli arouse pupil response along their drive in excelling in things.

Stimulation of pupil purposing includes in this sense a wide range of stimuli along the following lines:

I. *Stimulation of Construction Purposing.* Workshop with tools and material for construction in wood, metal, textiles, clay, paper, yarn, leather, cardboard, raffia, reed, paint and water color, crayola, foods, and type.

II. *Stimulation in Communication Purposing.* Story books, music books, song books, and pictures in fairy tales, myths, legends, fables, invention, industries, science, animal life, plant life, earth and sky, travel, exploration, sightseeing, adventure, humor, fiction, history, and biography.

III. *Stimulation in Excursion Purposing.* Community occupations, industries, plant life, animal life, fields, forests, garden, earth and sky as well as experimental laboratories and libraries dealing with human activities and natural phenomena.

IV. *Stimulation in Play Purposing.* Playground and gymnasium equipped with apparatus for volley ball, baseball, football, basketball, indoor baseball, Roly Poly, bean bag, tenpins, track, tennis, checkers, dominoes, etc.

V. *Stimulation in Skill Purposing.* Tools and equipment for practise in handwriting, typewriting, letter writing, composition, dancing, swimming, skating, music, etc.

Stimulation of pupil purposing demands, in this sense, varied stimuli. It includes varied games and contests, stories, natural phenomena, tools and materials, social converse, and occupations, and, as such, it stimulates pupil purposing along all the lines of purposeful activity. The first function of the teacher in pupil purposing, then, is to provide richly the stimuli of the real world about boys and girls.

7. **Direction in Pupil Purposing.** Guidance in this particular involves, as we have seen, direction of response of boys and girls along their drive in the face of difficulties in the initiation, evaluation, and choice of goal. It sees that success attends response of boys and girls along each of these steps. It is, in this sense, along three lines. The first line involves direction in the initiation of goals. This includes aid on the part of the teacher in the pupil's initiation of a particular goal, say, in stories. It includes, first, aid in perusal of the books in the library noting the different kinds of stories, titles of stories, pictures in different stories, and the table of contents of different stories, and second, aid in suggesting particular stories to study. The second line involves direction in the evaluation of goals. This includes, in the case of stories, aid in the pupil's discussion of the different stories initiated, noting in this connection what each story is about and its difficulty in reading. The third line involves direction in the choice of a particular goal. This involves aid in the pupil's choice of a particular story to pursue. The lines of direction may be summarized as follows:

I. *Direction of Initiation of Goal.* This involves provision for boys and girls to survey and suggest things, for example, to peruse through the story books in the library and suggest stories to study. Direction sees that success attends the pupil's initiation of a story to study.

II. *Direction of Evaluation of Goal.* This involves provision for boys and girls to study the desirability and practicability of each suggested goal; for example, a study of what the suggested story is about and difficulties in its reading. Direction sees that success attends the pupil's study of the desirability and practicability of the suggested story.

III. *Direction in Choice of Goal.* This involves provision for boys and girls to choose a particular goal to pursue, for example, to choose a particular story. Direction sees that success attends the pupil's choice of a particular story to study.

Direction of pupil purposing is, in this sense, aiding boys and girls to respond successfully in the face of difficulties arising along their initiation, evaluation, and choice of goal. It is, in this sense, varied. In one case, it may be the teacher aiding a pupil to respond along its drive in the face of difficulty in the initiation of a goal, say, in stories; in another case, it may be the teacher aiding another pupil to respond along its drive in the face of difficulty in the evaluation of goals, say, in play; still in another case it may be the teacher aiding a child to respond along its drive in the face of difficulty in the choice of a particular goal, say, in construction. In fact, direction is along all the steps of purposing in each of the five lines of purposive behavior. It involves direction in the initiation, evaluation, and choice of goal in Excursion Activities, Communication Activities, Construction Activities, Play Activities, and Skill Activities. It is, in this sense, extremely varied.

8. **Teaching Procedure in Pupil Purposing.** Pupil purposing involves, as we have seen, three interrelated steps. It involves, in every instance, the initiation of goal, the evaluation of goal, and the choice of goal. The school procedure should provide for each of these steps. It should provide opportunity for boys and girls to suggest the goal that they desire to pursue. As the goals are suggested, in

the case of group activity, they should be recorded on the blackboard so that they will be available for the other steps. This is the initiation of goals. In the second place, the school procedure should provide opportunity for boys and girls to study and discuss, in an informal manner, the desirability and practicability of the suggested goals. This should include, in every instance, a study and discussion of the different things that may be obtained from a study of the suggested goals, means available for pursuing them, and possibility of pursuing them at the time. This is evaluation of goal. In the third place, the school procedure should provide opportunity for boys and girls to express a preference for or against the suggested goals on the basis of the evaluation. In case of group activity, a majority of the pupils expressing a preference for a particular goal should control in the choice of the goal to pursue, since this is the usual manner in making choices in life outside of the school. This is choice of goal. The other goals suggested and considered feasible in connection with the final choice should be recorded in the class record book for further consideration on a later date. In brief, the teaching process should include the following procedure:

TEACHING PROCEDURE IN PURPOSING

I. Stimulate and direct boys and girls in suggesting goals to pursue.
II. Stimulate and direct boys and girls in discussing desirability and practicability of the suggested goals.
III. Stimulate and direct boys and girls in expressing a preference for or against the suggested goals.

This procedure is applicable to both individual and group enterprises. It differs only in the number that participate in such. In individual activity it involves an individual pupil and the teacher, while in group activity the procedure involves a group of pupils and the teacher. In either case the function of the teacher is to stimulate and direct the response of boys and girls along their drive in these steps. The teacher provides, in the first place, stimuli capable of arousing the response of boys and girls along their drive in the initiation, evaluation, and choice of goals, and in the second place, she sees that success attends their response along these steps. This is guidance in pupil purposing.

9. **Illustration of Teaching Procedure in Purposing.** The teaching procedure in purposing includes two major parts. The first part includes making available stimuli conducive of response of boys and girls along their drive in the initiation, evaluation, and choice of goals. This step demands that the teacher do two things. First, it demands that the teacher familiarize herself with stimuli conducive to the response of boys and girls along their drive in the initiation, evaluation, and choice of goals. This involves study on the part of the teacher of available stimuli as compared to what the stimuli should be. Second, it demands making available stimuli conducive to the response of boys and girls along their drive in the initiation, evaluation, and choice of goals. This involves making available such stimuli in the school.

The second part includes direction in enabling boys and girls to respond successfully along their drive in the initiation, evaluation, and choice of goal. This step demands that the teacher provide aid along two major lines. First, it demands that the teacher provide opportunity for each pupil to respond along its drive in the initiation, evaluation, and choice of goal. This involves making it possible for each pupil to participate along each of these lines. Second, it demands that the teacher aid each pupil individually in overcoming any difficulty encountered in the initiation, evaluation, and choice of goal. This demands that the teacher see that success attends pupils along these lines. The following illustrates concretely the teaching procedures for each of the traits of purposing in Excursion Activity. The first procedure provides stimulation and direction of a group of boys and girls in the initiation of goals in Excursion Activity; the second, stimulation and direction in the evaluation of goals; and the third, stimulation and direction of choice of goals in this activity.

TEACHING PROCEDURE

ACTIVITY Excursion Activity GRADE 9th DATE March 12th NUMBER 1

DIFFICULTY	*PROCEDURE*		*IMPROVEMENT*	
	STIMULATION	*DIRECTION*	*SOUGHT*	*OBTAINED*
Drive and Response on part of all the pupils in the Initiation of Goals in Excursion Activity.	1. Give each pupil a printed list of problems suggested by pupils in the past. 2. Explain to the pupils at the time that these problems have been suggested by other pupils and are suggestive problems for the class. Make clear that pupils may study problems not on the list.	1. Provide opportunity for pupils to go over the list of suggested problems for the purpose of finding a particular problem to suggest to study. 2. Provide opportunity for each pupil to suggest a problem to study. Aid pupil, if necessary, in stating problem properly.		

TEACHING PROCEDURE

ACTIVITY Excursion Activity GRADE 9th DATE March 13th NUMBER

DIFFICULTY	*PROCEDURE*		*IMPROVEMENT*	
	STIMULATION	*DIRECTION*	*SOUGHT*	*OBTAINED*
Drive and Response on part of all pupils in the Evaluation of Goals in Excursion Activity.	1. Provide the pupils with the following books dealing with the problems suggested to study: The Book of Knowledge The World Book Hill: Community Life and Civic Problems Boeker: Our National Forests Bigelow: Applied Biology Hassler: First Year Science Caldwell and Eikenberry: General Science Dunn: Community Civics 2. Provide each pupil with written list of pupil-suggested problems as follows: How our post office is run How the fire department protects our home How we get our water How our city is governed How our president is elected	1. Provide opportunity for the pupils to study the books for the purpose of making a printed list of points for and against the study of suggested problems. Aid individually Willie, Jane, Ned, and Fred in studying books and in making a written list of points. 2. Aid pupils, when necessary, in overcoming difficulties (spelling, punctuation, etc.) in making the written list of points. 3. Provide opportunity for each pupil to discuss the good and bad points of his problem to the class.	Drive on the part of:	
			a) Willie	1
			b) Jane	1
			c) Ned	
			d) Fred	

TEACHING PROCEDURE

ACTIVITY Excursion Activity GRADE 9th DATE March 15th NUMBER 3

DIFFICULTY	*PROCEDURE*		*IMPROVEMENT*	
	STIMULATION	*DIRECTION*	*SOUGHT*	*OBTAINED*
Drive and Response on part of all pupils in the Choice of Goal in Excursion Activity	1. Write the following list of pupil-suggested problems on the blackboard: How Mr. Smith makes our ice How the fire department protects our home How we get our water How our city is governed How our president is elected How our cotton is ginned How modern inventions have changed our ways of living How America became a nation How we get our gasoline How our grocery store is managed How Mr. Hutto runs his bank How our post office is run How our state laws are made	1. Provide opportunity for the pupils to go over the list of suggested problems with a view of deciding on a particular problem to study.	Drive on the part of:	
			a) Ned	1
			b) Fred	1
			c) Willie	
		2. Provide opportunity for each pupil to express his choice for a particular problem to study. Use written ballots.		
		3. Help pupils, if necessary, to determine what problem received a majority choice of the class.		

CHAPTER XVI

NATURE OF GUIDANCE IN SUCCESSFUL PLANNING

1. Pupil Planning. Purposive behavior contemplates pupil planning in every instance. It does for at least two reasons. In the first place, purposive behavior involves the functioning of a series of interrelated aggregates of stimulus-response mechanisms, and, as such, involves the response of boys and girls along their drive in this step, for stimulus-response mechanisms function in this manner. Pupil planning is, in this sense, demanded in every instance for without it purposive behavior would be impossible. Second, planning is one of the lines of growth. Growth of boys and girls is, as we have seen, change in drive and response and it takes place in this step through the boys and girls responding along their drive. It is in this fashion boys and girls grow in planning—in finding means necessary in the attainment of a particular goal. Pupil planning is, in this sense, the basis of growth in this phase of conduct. Such growth is desirable for the success of an individual in a democracy depends very largely upon ability to formulate effective plans for the attainment of chosen goals. If the teacher does the planning growth in this step is thwarted. The resultant change is in the teacher's drive and response since it is her stimulus-response mechanisms that function in planning. Teacher planning blocks, in this sense, the functioning of the stimulus-response mechanisms of boys and girls along this line and in so doing prohibits growth in planning. Pupil planning thus is basic in purposive behavior and growth. Without it purposive behavior, on the one hand, is thwarted, and, on the other hand, growth in this phase of conduct is blocked.

2. **Procedure in Pupil Planning.** Planning involves, as we have seen, three interrelated steps. First, it includes the initiation of means. This involves boys and girls suggesting means for the attainment of a chosen goal. Luetta's suggestion of James for Governor Bradford's part in the First Thanksgiving story is an instance.[1] Second, it involves evaluation of means. This involves discussion of the desirability and practicability of the suggested means. Frank's explanation that James would be a good manager is an illustration. Third, it involves choice of means. This involves preference for or against particular means. Donald's decision to have James for Governor Bradford's part is an example. The functioning of each of these steps in this constitutes the procedure of pupil planning.

PROCEDURE IN PUPIL PLANNING

I. Initiation of Means
II. Evaluation of Means
III. Choice of Means

3. **Successful Pupil Planning.** Planning involves, as we have seen, the initiation of means, evaluation of means, and choice of means. These are the traits of planning. The functioning of each trait includes the pupil's response along its drive, for stimulus-response mechanisms involved in each trait function in this fashion. The functioning of the initiation of means, for example, involves the pupil re-

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[1] For an account of this activity, see Chapter XIII.

sponding along its drive in suggesting means for the attainment of the chosen goal. The same is equally true of the other traits of planning. Successful planning is, in this sense, the pupil responding along its drive consecutively in the initiation of means, evaluation of means, and choice of means. It is, in other words, the pupil itself performing each of these steps in this order.

4. **Guidance in Pupil Planning.** Pupil planning involves, as we have seen, the response of boys and girls along their drive in the initiation of means, evaluation of means, and choice of means, and as such, involves guidance, for pupil response along their drive depends upon stimulation and direction. Guidance in planning, for this reason, is along two lines. In the first place, it provides stimulation of pupil response along their drive in the traits of planning. It provides stimuli capable of stimulating pupil response along their drive in each of these steps. Guidance in planning includes, in this sense, stimulation and direction of pupil response along the drive in the initiation of means, evaluation of means, and choice of means.

5. **Guidance and Growth.** Guidance in pupil planning is fundamental for at least two reasons. First, pupil planning depends in every instance upon stimuli capable of arousing the response of boys and girls along their drive in the traits of planning. Guidance provides such stimuli and for this reason is fundamental in pupil planning. Second, pupil planning depends upon direction of response along drive in the traits of planning. Guidance provides such direction. It sees that success attends response of boys and girls along their drive in each of the several steps and is, for this reason, fundamental in pupil plan-

ning. Guidance is, in this sense, fundamental in pupil planning, for without it pupil response along drive would be thwarted in one or all the steps as a result of a lack of proper stimuli or proper aid. Successful planning contemplates in every case a teacher, for the function of the teacher is, as we have seen, to afford boys and girls guidance along their drive. The teacher provides, on the one hand, stimuli capable of arousing the response of boys and girls along their drive in the several traits of planning and, on the other hand, provides aid in enabling them to respond successfully along each of the steps.

6. Stimulation in Pupil Planning. Guidance through stimulation involves, as we have seen, stimuli capable of arousing the response of boys and girls along their drive in the traits of planning. It takes place through the teacher providing such stimuli. The two points that guide the teacher in providing stimuli in child purposing prevail here. In the first place, the stimulation should be varied because of individual differences in the purposive behavior of boys and girls. In the second place, the stimulation should be along the five major lines of purposive behavior. It should include stimuli capable of arousing pupil response along drive in planning of Excursion, Construction, Play, Communication, and Skill Activities. Stimulation of pupil planning includes, in this sense, a wide range of stimuli along the following lines:

I. *Stimulation in Construction Planning*. Books, bulletins, pictures, and designs dealing with how to do construction in wood, metal, textiles, clay, paper, yarn, leather, cardboard, raffia, reed, paint, and water colors, crayola, foods, and type, as well as tools and workshops for each of these lines of construction.

II. *Stimulation in Communication Planning.* Story books in English, French, Spanish, German, etc., dealing with how to engage in dramatization, story telling, reading, and short story writing.

III. *Stimulation of Excursion Planning.* Books, bulletins, pictures, and exhibits dealing with how to study community occupations, industries, plant life and animal life, fields, and forests, and earth and sky.

IV. *Stimulation in Play Planning.* Books, bulletins, pictures, and designs, dealing with how to engage in indoor and outdoor play, such as volley ball, football, basketball, baseball, tennis, hockey, track, Roly Poly, tenpins, bean bag, checkers, dominoes, indoor baseball, etc.

V. *Stimulation in Skill Planning.* Books, bulletins, charts, and models dealing with how to acquire skill in typewriting, singing, penmanship, dancing, composition, debating, public speaking, instrumental music, etc.

7. **Direction in Pupil Planning.** Direction involves, as we have seen, teacher aid in pupils' initiation, evaluation, and choice of means. It sees, in other words, that success attends the response of boys and girls along their drive in the face of difficulties in each of these steps. Direction is, in this sense, along three lines. The first line involves direction in initiation of means. This includes aid on the part of the teacher in the pupil's initiation of means. This includes, say, in making a book rack, at least the following teacher aids:

I. *Direction in Initiation of Means.* The first line involves direction in the suggestion of means for the achievement of a goal. It includes five different kinds of aid:

(a) Helping the pupil, if necessary, to secure books, bulletins, pictures, and designs dealing with the processes, tools, and materials in making a book rack.

(b) Helping the pupil, if necessary, to find out what parts of the study sources to study in finding out the processes, tools, and materials in making a book rack.

(c) Helping the pupil, if necessary, to overcome any difficulty arising in reading and interpreting the several study sources.

(d) Helping the pupil, if necessary, to point out the different processes, tools, and materials involved in making a book rack as suggested by the several study sources.

(e) Helping the pupil, if necessary, to make a list of the processes, tools, and materials suggested by the study sources for making a book rack.

II. *Direction in Evaluation of Means.* The second line involves direction in evaluation of means. This includes in case of the book rack illustration at least the following teacher aids:

(a) Helping the pupil, if necessary, to secure books, bulletins, pictures, and designs dealing with the importance and difficulty of the several processes, tools, and materials involved in making a book rack.

(b) Helping the pupil, if necessary, to find the parts in the study sources that deal with the importance and difficulty of the processes, tools, and materials involved in making a book rack.

(c) Helping the pupil, if necessary, to overcome any difficulty occurring in reading and interpreting the several study sources.

(d) Helping the pupil, if necessary, to find out from the study sources the importance and difficulty of the different processes, tools, and materials.

III. *Direction in Choice of Means.* The third line involves direction in choice of means. This involves in the above illustration at least the following teacher aids:

(a) Helping the pupil, if necessary, to make a list of the processes, tools, and materials considered necessary in making a book rack.

(b) Helping the pupil, if necessary, to overcome any difficulty in handwriting, spelling, and calculation involved in listing the several processes, tools, and materials.

Direction of pupil planning is, in this sense, enabling boys and girls to respond along their drive in the face of difficulties in the initiation, evaluation, and choice of means. It is, in this sense, varied. In one instance it may be the teacher aiding a pupil to respond along its drive in the face of a difficulty in the initiation of means; in another instance it may be the teacher aiding another pupil in the evaluation of means; in still another instance it may be the teacher aiding a pupil to respond along its drive in the choice of means. Direction is, in this sense, along all the steps of planning for each of the five lines of purposeful activity. It includes, in other words, directing the response of boys and girls along their drive in the initiation, evaluation, and choice of means, in Excursion Activities, Construction Activities, Communication Activities, Play Activities, and Skill Activities. It is, in this sense, extremely varied.

8. **School Procedure in Pupil Planning.** Pupil planning involves, as we have seen, three interrelated steps. It involves, in every instance, the initiation of means, the evaluation of means, and the choice of means. The school procedure should provide for each of these steps. It should provide opportunity for boys and girls to suggest the means

they consider necessary to achieve the chosen goal. As the means are suggested, in case of group activity, they should be recorded on the blackboard so that they will be available for the other steps. This is the initiation of means. In the second place, the school procedure should afford opportunity for boys and girls to study and discuss the desirability and practicability of the suggested means. This should include, in every instance, a study and discussion of the method involved in performing each suggested means and the possibility of performing it at the time. This is evaluation of means. In the third place, the school procedure should provide opportunity for boys and girls to express a preference for or against the use of each suggested means on the basis of the evaluation. In case of group activity, a majority of the pupils expressing a preference for a particular means should control in the choice of means to use in the attainment of the chosen goal. This is choice of means. In brief, the school procedure should provide for the following steps:

TEACHING PROCEDURE IN PUPIL PLANNING

I. Stimulate and direct boys and girls to suggest means considered necessary to attain the chosen goal.
II. Stimulate and direct boys and girls to study and discuss the desirability and practicability of the suggested means.
III. Stimulate and direct boys and girls to express a preference for or against each of the suggested means.

This procedure is applicable to both individual and group activities. It differs only in the number that participate in each step. In individual activity the procedure involves an individual pupil and the teacher. In either case, the function of the teacher is stimulation and direction of the response of boys and girls along their drive in each of the traits of planning. The teacher provides, in the first place, stimuli capable of arousing the response of boys and girls along their drive in each of the steps, and, in the second place, sees that success attends their response along each of these steps. This is guidance in pupil planning.

9. Illustration of Teaching Procedure in Planning. The teaching procedure in planning includes two major parts. The first part includes making available stimuli conducive to response of pupils along their drive in the initiation, evaluation, and choice of means. The step demands two lines of effort on part of the teacher. First, it demands that the teacher familiarize herself with stimuli conducive to the response of pupils along their drive in the traits of planning. This demands study of available stimuli as compared to what should be along these lines. Second, it demands making available stimuli conducive to response of pupils along their drive in the traits of planning. This demands making available such stimuli in the school.

The second part includes direction in enabling boys and girls to respond successfully along their drive in the traits of planning. This demands that the teacher provide aid along two major lines. First, it demands that the teacher provide opportunity for each pupil to respond along its drive in the initiation, evaluation, and choice of means. This involves making it possible for each pupil to participate along each of these lines. Second, it demands that the teacher aid each pupil individually in overcoming any difficulty encountered along the traits of planning. This demands that the teacher see that success attends pupils along these lines. The following illustrates concretely the teaching procedures for each of the traits of planning. The first set of procedures provides stimulation and direction of a group of boys and girls in the initiation, evaluation, choice of means (sources of information) in the study of how ice is made. The second set illustrates stimulation and direction in the initiation, evaluation, and choice of means (things to find out) in the study of how ice is made; and the third set provides stimulation and direction in the initiation, evaluation, and choice of means (procedure of study) in the study of how ice is made.

TEACHING PROCEDURE

ACTIVITY How Mr. Smith Makes Our Ice GRADE 9th DATE March 16th NUMBER 1

DIFFICULTY	*PROCEDURE*		*IMPROVEMENT*	
	STIMULATION	*DIRECTION*	*SOUGHT*	*OBTAINED*
Drive and Response on part of all the pupils in the Initiation of Means (Sources of Information).	1. Provide each pupil with a printed copy of the following source material. Explain to the pupils at the time that this list is suggestive (and not all) of the source material available in the school library. *Books* The Book of Knowledge The World Book Fall: Science for Beginners Hassler: First Year Science The International Encyclopedia *Bulletins* How Ice Is Manufactured How to Care for Ice in the Home *Pictures* How Ice Is Manufactured (slides)	1. Provide opportunity for each pupil to visit the school library for the purpose of making a printed list of source material. Aid individually Willie in making a list of source material. 2. Aid pupils, when necessary, in overcoming difficulties (spelling, English, etc.) in listing materials properly. 3. Provide opportunity for each pupil to suggest his list of source material to the class. 4. Aid pupils, if necessary, in stating the material, properly. Write suggested material on the blackboard.	Drive and response on the part of: a) Willie	1

TEACHING PROCEDURE

ACTIVITY How Mr. Smith Makes Our Ice GRADE 9th DATE March 20th NUMBER 2

DIFFICULTY	*PROCEDURE*		*IMPROVEMENT*	
	STIMULATION	*DIRECTION*	*SOUGHT*	*OBTAINED*
Drive and Response on the part of all the pupils in the Evaluation of Means (Sources of Information)	1. Make available in the school library the following pupil suggested source material: *Books* The Book of Knowledge The World Book The International Encyclopedia Carpenter: How the World Is Fed Dunn: Community Civics Fall: Science for Beginners Washburne: Common Science Hassler: First Year Science Caldwell and Eikenberry: General Science Lapp: Our America *Bulletins* How Ice Is Manufactured How to Care for Ice in the Home *Pictures* How Ice Is Manufactured	1. Provide opportunity for each pupil to visit the school library for the purpose of studying the desirability of the suggested source material. Aid individually Fred, Mary, and John in finding the material and determining its good points (amount of material included in each source, nature of material, etc.) 2. Provide opportunity for each pupil to discuss good and bad points (amount of material included in each source, nature of the material, etc.) of his list of suggested source material.	Drive and Response on part of:	
			a) Ned	
			b) Fred	
			c) Mary	1
			d) John	1

TEACHING PROCEDURE

ACTIVITY How Mr. Smith Makes Our Ice GRADE 9th DATE March 22nd NUMBER 3

DIFFICULTY	*PROCEDURE*		*IMPROVEMENT*	
	STIMULATION	*DIRECTION*	*SOUGHT*	*OBTAINED*
Drive and Response on the part of all pupils in the Choice of Means (Sources of Information)	1. Provide each pupil with a written list of the pupil suggested source material listed on the teaching procedure of March 20th.	1. Provide opportunity for each pupil to go over the list of suggested source material with a view of deciding on particular material to study. Aid individually Ned and Fred in making a list of source material they desire to use.	Drive and Response on the part of:	
			a) Ned	1
			b) Fred	1

TEACHING PROCEDURE

ACTIVITY How Mr. Smith Makes Our Ice GRADE 9th DATE March 26th NUMBER 1

DIFFICULTY	*PROCEDURE*		*IMPROVEMENT*	
	STIMULATION	*DIRECTION*	*SOUGHT*	*OBTAINED*
Drive and Response on the part of all pupils in Initiation of Means (Things to Find Out)	1. Provide the following material selected by the pupils: *Books* The Book of Knowledge, Vol X The World Book, Vol. V Caldwell and Eikenberry; General Science Hassler: First Year of Science *Bulletins* How Ice Is Manufactured How to Care for Ice in the Home *Pictures* How Ice Is Manufactured (Slides) *Exhibits* Chart: Processes of Ice Making Mr. Smith's Ice Plant	1. Provide opportunity for pupils to study source material for the purpose of making a written list of things to find out about the manufacture of ice. 2. Aid pupils, if necessary, in overcoming any difficulties (English, spelling, etc.) in making the list. 3. Provide opportunity for each pupil to suggest the things he desires to find out about the manufacture of ice. 4. Aid pupils, if necessary, in stating suggestions on the blackboard.	Drive on part of: a) Lucy b) Carl c) John d) Mary	1

TEACHING PROCEDURE

ACTIVITY How Mr. Smith Makes Our Ice GRADE 9th DATE March 29th NUMBER 2

DIFFICULTY	*PROCEDURE*		*IMPROVEMENT*	
	STIMULATION	*DIRECTION*	*SOUGHT*	*OBTAINED*
Drive and Response on the part of all pupils in the Evaluation of Means (Things to Find Out)	1. Provide each pupil with a printed list of the following suggested things to find out about ice making: How ice is frozen How ice cream is made How ice is kept after it is frozen What kind of water is used in ice making Is ice frozen in blocks How big are ice blocks Where are ice plants located What makes ice water taste bad Is ammonia used in making ice What does it cost to make ice What kind of machinery is used in making ice Is the ice plant sanitary 2. Provide pupils with a printed list of the selected source material listed on the teaching procedure of March 26th.	1. Provide opportunity for pupils to study the source material with a view of making a written list of good and bad points included in suggested things to find out. Aid individually Lucy, Carl, and John in studying the material and in making their written lists. 2. Aid pupils, if necessary, in overcoming any difficulties in making the list. 3. Provide opportunity for each pupil to discuss the good and bad points included in each suggested thing to find out.	Drive on the part of: a) Lucy b) Carl c) John	1

TEACHING PROCEDURE

ACTIVITY How Mr. Smith Makes Our Ice GRADE 9th DATE April 2nd NUMBER 3

DIFFICULTY	*PROCEDURE*		*IMPROVEMENT*	
	STIMULATION	*DIRECTION*	*SOUGHT*	*OBTAINED*
Drive and Response on the part of all pupils in the Choice of Means. (Things to Find Out)	1. Provide each pupil with a written list of the pupil suggested things to find out about ice making listed in the teaching procedure of March 29th.	1. Provide opportunity for each pupil to go over the list of suggested things to find out with a view to determining which should be selected to study. Aid Carl and John individually in making a list of things to find out.	Drive on the part of:	
			a) Carl	1
			b) John	1
		2. Provide opportunity for each pupil to express a choice for the things to find out he desires to study.		
		3. Aid pupils, if necessary in overcoming any difficulties (English, spelling, etc.) in writing the choices on the plan sheet.		

TEACHING PROCEDURE

ACTIVITY How Mr. Smith Makes Our Ice GRADE 9th DATE April 4th NUMBER 1

DIFFICULTY	*PROCEDURE*		*IMPROVEMENT*	
	STIMULATION	*DIRECTION*	*SOUGHT*	*IMPROVED*
Drive and Response on part of all pupils in the Initiation of Means (Procedure of Study)	1. Provide pupils with a written list of the following: *Things to Find Out* How ice is frozen How ice is kept Kind of water used in making ice Is ice frozen in blocks How big are ice blocks What makes the white spots in ice What does it cost to make ice Kind of machinery used Is the ice plant sanitary *Source Material* *Books* The Book of Knowledge, Vol. X The World Book, Vol. V Caldwell and Eikenberry: General Science Hessler: General Science	1. Provide opportunity for the pupils to study the selected (1) Things to Find Out and (2) the Source Material with a view of determining the procedure of study. 2. Provide opportunity for each pupil to suggest a procedure of study. Aid pupils, if necessary, to state suggestions properly.		

TEACHING PROCEDURE

ACTIVITY How Mr. Smith Makes Our Ice GRADE 9th DATE April 6th NUMBER 2

DIFFICULTY	*PROCEDURE*		*IMPROVEMENT*	
	STIMULATION	*DIRECTION*	*SOUGHT*	*OBTAINED*
Drive and Response on the part of all pupils in the Evaluation of Means (Procedure of Study)	1. Provide each pupil with a written copy of the pupil suggested procedures of study. The following illustrates one: A) Visit Mr. Smith's ice plant and collect information on things selected to find out. Set down in notebook information collected. B) Read the books and bulletins and collect information on things selected to find out. Make notes on readings. C) Study the picture (slides) on the manufacture of ice. D) Discuss in class the information collected on things selected to find out for the purpose of arriving at particular conclusions.	1. Provide opportunity for pupils to study the suggested procedures with a view to determine points for and against them. 2. Provide opportunity for pupils to discuss in class the points for and against the suggested procedures.	Drive and Response on part of: a) Henry b) Mary c) Lucile	1

TEACHING PROCEDURE

ACTIVITY How Mr. Smith Makes Our Ice GRADE 9th DATE April 10th NUMBER 3

DIFFICULTY	*PROCEDURE*		*IMPROVEMENT*	
	STIMULATION	*DIRECTION*	*SOUGHT*	*OBTAINED*
Drive and Response on the part of all the pupils in the Choice of Means (Procedure of Study)	1. Provide pupils with a written list of the suggested procedures of study listed in the teaching procedure of April 6th.	1. Provide opportunity for each pupil to express a choice for the procedure of study he desires to follow. Aid Henry and Mary in expressing a choice. 2. Aid pupils, if necessary in making a written plan of the procedure of study selected.	Drive and Response on part of:	
			a) Henry	1
			b) Mary	1

CHAPTER XVII

NATURE OF GUIDANCE IN SUCCESSFUL EXECUTION

1. **Pupil Execution.** Purposive behavior contemplates pupil execution in every instance. In the first place, purposive behavior involves the functioning of a series of interrelated aggregates of stimulus-response mechanisms along a particular line. Execution is the functioning of one of these aggregates of mechanisms, and, as such, involves the response of boys and girls along their drive in this step, for, as we have seen, stimulus-response mechanisms function in this fashion. Pupil execution is, in this sense, demanded in every case, for without it purposive behavior would be impossible. Second, execution is one of the lines of growth. Growth of boys and girls is, as we have seen, change in drive and response along the traits of purposive behavior, and it takes place in this trait through pupils responding along their drive. It is in this fashion that boys and girls grow in execution—in attaining proficiency in the achievement of a chosen goal. Pupil execution is, in this case, the basis of growth in this phase of conduct. Growth along this line is desirable for the success of an individual in a democracy depends largely upon proficiency in the achievement of chosen goals. If the teacher does the execution, growth in this phase of conduct is thwarted. The resultant change is in the teacher's drive and response, since it is her stimulus-response mechanisms that function in the

execution of the means in the attainment of the goal. Teacher execution blocks, in every instance, the functioning of the stimulus-response mechanisms of boys and girls along this line and in so doing prohibits growth in execution in the performance of means. Pupil execution is, in this sense, basic in purposive behavior and growth. Without it purposive behavior, on the one hand, is prohibited and, on the other hand, growth in this phase of conduct is thwarted.

2. **Procedure in Pupil Execution.** Execution involves, as we have seen, performance of the means included in a plan designed for the attainment of a particular goal. It involves, in every instance, response of boys and girls along their drive in the performance of a particular means. The procedure in pupil execution involves in this sense overt performance of the means included in a particular plan.

3. **Successful Pupil Execution.** Execution involves, as we have seen, boys and girls responding along their drive in the performance of the means designed to attain a particular goal. Successful execution involves two points. First, it involves pupil performance of all the means included in the plan. It is the pupil itself performing each of the several means included in the plan. Second, it involves pupil performance of each mean as designed in the plan. It is the pupil itself performing each mean in accordance with the method formulated in the plan for performing the several means. Successful pupil execution is, in other words, the pupil itself performing all the means included in the plan in accordance with the method formulated for each mean.

4. **Guidance in Pupil Execution.** Pupil execution involves, as we have seen, response of boys and girls along

their drive in the performance of means designed to attain a particular goal, and, as such, involves guidance for response along this drive depends upon stimulation and direction. Guidance in execution, for this reason, is along two lines. First, it provides stimulation of pupils' response along their drive in the performance of means. It provides stimuli capable of arousing pupils' response along their drive in the performance of each mean included in the plan. Second, it provides direction of pupils' response along their drive in the performance of means. It sees that success attends pupils' response in the performance of each of the means included in the plan. Guidance in this sense is fundamental in pupil execution. Pupil execution, in the first place, depends in every instance upon stimuli capable of arousing pupils' response along their drive in the performance of each means included in the plan. Guidance provides such stimuli and is for this reason fundamental in pupil execution. In the second place, pupil execution depends upon direction of response along the drive in the performance of each means included in the plan. Guidance provides such direction. It sees that success attends pupils' response in the performance of all the means included in the plan.

5. **Guidance and Growth.** Guidance is, in this sense, fundamental in pupil execution, for without it pupils' response along their drive in the performance of means would be thwarted in many instances for lack of proper stimuli or proper aid. Successful pupil execution thus contemplates a teacher in every instance, for, as we have seen, the function of the teacher is to afford pupils guidance in purposeful activity. The teacher provides, on the one hand, stimuli capable of arousing response of boys and girls along their drive in the performance of each means included in the plan,

and on the other hand, enables them to respond successfully in the performance of each means.

6. Stimulation in Pupil Execution. Stimulation in pupil execution involves the means included in the formulated plans for attaining particular goals. It takes place through the teacher making available the books, apparatus, equipment, processes, and materials included in the formulated plans. The two points that guide the teacher in providing stimulation in pupil planning prevail here. The stimulation should, in the first place be varied because of individual differences in pupils, and, in the second place, it should be along the five lines of purposive behavior. It includes, in this sense, a wide range of stimuli along the following lines:

I. *Stimulation in Construction Execution.* Processes, tools, and materials included in the formulated plans for construction in wood, metal, textiles, clay, paper, yarn, leather, cardboard, raffia, reed, paint and water colors, crayola, food, and type.

II. *Stimulation in Communication Execution.* Books, equipment, and materials included in the formulated plans for dramatization, story telling, dramatic reading, and short-story writing in English, French, German, etc.

III. *Stimulation in Excursion Execution.* Things to find out and sources of information included in the formulated plans for study of occupations, industries, plant and animal life, field and forest, and earth and sky.

IV. *Stimulation in Play Execution.* Processes, apparatus, and materials included in the formulated plans for practise in singing, typewriting, penmanship, dancing, composition, debating, swimming, etc.

7. Direction in Pupil Execution. Direction in pupil execution involves, as we have seen, aid in enabling boys and girls to perform successfully all the means designed for the attainment of a particular goal. It sees, in other words, that success attends response of boys and girls along their drive in the face of difficulties in performing particular means. It involves aid, for example, in John's difficulty in performing the process of varnishing included in his plan for making a book rack. The teacher, in this instance, enables John to mix the varnish, determine the proper thickness of each coat, and how to use the brush in spreading the varnish. She provides, in other words, opportunity for John to experiment with each of these steps before performing the process of varnishing the book rack. Direction, in this sense, is varied since all pupils do not face the same difficulties in performing the means included in particular plans. In one case, it may include the teacher aiding a pupil in performing the process of varnishing a book rack; in another case it may be the teacher aiding a pupil in performing the process of bowling in Roly Poly; still in another case it may be the teacher enabling a pupil in performing the process of reading, in dramatizing a story, and so on for all the different pupils engaging in the different lines of activities. Direction, in this sense, is along each of the five lines of purposive behavior. It includes, in other words, aid in response of boys and girls along their drive in performing the means included in the plans for pursuing Excursion Activities, Play Activities, Communication Activities, Construction Activities, and Skill Activities.

8. Teaching Procedure in Pupil Execution. Pupil execution involves, as we have seen, overt performance of the means included in a plan designed for the attainment of a particular goal. It involves, in every instance, pupils' response along their drive in the performance of particular means. The school procedure should provide for pupils' performance of means. It should provide opportunity for each pupil to actively engage in performing each of the means included in a plan. This is execution of means. In brief, the teaching procedure should provide the following:

TEACHING PROCEDURE IN PUPIL EXECUTION

I. Stimulate and direct boys and girls to engage actively in performing each of the means included in the plan.

This procedure is applicable to both individual and group activity. It differs only in the number that participate in this step. In individual activity the procedure involves an individual pupil and the teacher performing all the means, while in group activity it involves a group of pupils and the teacher performing the means of a particular plan. In either case, the function of the teacher is stimulation and direction of the response of boys and girls along their drive in the performance of all the means included in a particular plan. The teacher provides, on the one hand, stimuli capable of arousing pupils' response along their drive in the performance of the means included in a plan, and, on the other hand, sees that success attends their response in the performance of each of the means. This is guidance in pupil execution.

9. Illustration of Teaching Procedure in Execution. The teaching procedure in execution includes two major parts. The first part includes making available stimuli conducive to response of pupils along their drive in the performance of means selected to attain the chosen goal. This demands that the teacher do two things. First, it demands that the teacher familiarize herself with the stimuli involved in the performance of means selected to attain a chosen goal. This demands study of available stimuli as compared to what they should be along this line. Second, it demands making available the stimuli involved in the performance of means. This demands making available such stimuli in the school.

The second part includes direction in enabling boys and girls to respond successfully along their drive in the performance of means. This demands the teacher provide aid along two major lines. First, it demands that the teacher provide opportunity for each pupil to respond along its drive in the performance of means. This involves making it possible for each pupil to participate along this line. Second, it demands that the teacher aid each pupil individually in overcoming any difficulty encountered in the performance of the means. This demands that the teacher see that success attends each pupil along its drive. The following illustrates concretely the teaching procedure for the performance of means selected to attain a chosen goal. These procedures provide stimulation and direction in the performance of means (collecting information at the plant, studying the books and bulletins, studying the slides, and discussion of information collected).

TEACHING PROCEDURE

ACTIVITY How Mr. Smith Makes Our Ice GRADE 9th DATE April 12th NUMBER 1

DIFFICULTY	*PROCEDURE*		*IMPROVEMENT*	
	STIMULATION	*DIRECTION*	*SOUGHT*	*OBTAINED*
Drive and Response on part of all pupils in the Execution of Means (Collecting information at the ice plant)	1. Provide each pupil with a written list of the things selected to find out about ice making listed in the teaching procedure of April 4th. 2. Mr. Smith's ice plant.	1. Provide opportunity for the pupils to visit Mr. Smith's ice plant. 2. Aid pupils, if necessary, in collecting information at Mr. Smith's plant on the things selected to find out.		

TEACHING PROCEDURE

ACTIVITY How Mr. Smith Makes Our Ice GRADE 9th DATE April 16th NUMBER 2

DIFFICULTY	*PROCEDURE*		*IMPROVEMENT*	
	STIMULATION	*DIRECTION*	*SOUGHT*	*OBTAINED*
Drive and Response on part of all pupils in Execution of Means (Studying books and bulletins)	1. Provide pupils with the following books and bulletins: *Books* The Book of Knowledge, Vol. X The World Book, Vol. V. Caldwell and Eikenberry, General Science Hessler: General Science *Bulletins* How Ice Is Made 2. See that each pupil has a written list of the things selected to find out listed in the teaching procedure of April 4th.	1. Provide opportunity for the pupils to study the books and bulletins for the purpose of collecting information (making notes) on things selected to find out. Aid individually James, Mary, and Lucile in studying the books and in making notes on their readings. 2. Aid pupils, if necessary in overcoming difficulties in reading books and bulletins and making notes on their readings.	Response on the part of: a) James b) Mary c) Lucile	 1 1

TEACHING PROCEDURE

ACTIVITY How Mr. Smith Makes Our Ice GRADE 9th DATE April 20th NUMBER 3

DIFFICULTY	*PROCEDURE*		*IMPROVEMENT*	
	STIMULATION	*DIRECTION*	*SOUGHT*	*OBTAINED*
Drive and Response on the part of all pupils in the Execution of Means (Studying the slides)	1. Slides on the manufacture of ice. 2. See that each pupil has a written list of the things selected to find out listed in the teaching procedure of April 4th.	1. Provide opportunity for the pupils to observe the slides on the manufacture of ice with a view to collect information (making notes) on things selected to find out. 2. Aid Lucile and Willie in making their notes.	Response on the part of: a) Lucile b) Willie	1

TEACHING PROCEDURE

ACTIVITY How Mr. Smith Makes Our Ice GRADE 9th DATE April 23rd NUMBER 4

DIFFICULTY	*PROCEDURE*		*IMPROVEMENT*	
	STIMULATION	*DIRECTION*	*SOUGHT*	*OBTAINED*
Drive and Response on the part of all pupils in the Execution of Means (Discussion of information collected)	1. Provide each pupil with a written list of things to find out listed in teaching procedure of April 4th. 2. Notes of pupils made in visit to ice plant and from reference reading. 3. Books and bulletins listed in teaching procedure of April 4th.	1. Provide opportunity for pupils to discuss things selected to find out in terms of information collected with view of arriving at particular conclusions. Aid Willie individually in using his notes in discussion. 2. Aid pupils, if necessary in arriving at definite conclusions regarding things selected to find out.	Response on part of: a) Willie	1

CHAPTER XVIII

NATURE OF GUIDANCE IN SUCCESSFUL JUDGING

1. Pupil Judging. Purposive behavior involves pupil judging in every instance. It does for two major reasons. First, purposive behavior involves, as we have seen, the functioning of a series of interrelated stimulus-response mechanisms along a particular line. Judging is the functioning of one of these aggregates of mechanisms, and, as such, involves the response of boys and girls along their drive in this step for, as we have seen, stimulus-response mechanisms function in this way. Pupil judging is, in this sense, demanded in every instance for without it purposive behavior would be impossible. Second, judging is one of the lines of growth. Growth of boys and girls is, as we have seen, change in the drive and response along the traits of purposive behavior. It takes place, moreover, through boys and girls responding along their drive in each of the traits. It is in this fashion boys and girls grow in judging—in finding and correcting mistakes in the pursuit of particular goals. Pupil judging is, in this sense, the basis of growth in this phase of conduct. Growth along this line is desirable for the success of an individual in social life depends very largely upon carrying an enterprise through to successful conclusion. It depends, in other words, upon the individual's ability to find and correct mistakes in the pursuit of chosen goals. If the teacher does the judging, growth in this step is prohibited. The resultant change is in the teacher's drive and response since it is her stimulus-response mechanisms that function in judging. Teacher judging blocks, in this sense, the functioning of the stimulus-response mechanisms of boys and girls along this line and in so doing thwarts growth in judging. Pupil judging, thus, is fundamental in purposive behavior and growth. Without it purposive behavior, on the one hand, is thwarted, and, on the other hand, growth in this phase of conduct is blocked.

2. **Procedure in Pupil Judging.** Judging involves, as we have seen, four interrelated steps. First, it includes boys and girls suggesting changes (1) in choice of means, e.g., elimination, substitution, addition, or modification of the processes included in the plan, and (2) in execution of processes, e.g., performance of neglected processes included in the plan. Second, it includes evaluation of improvement. This includes pupils' study and discussion of (1) how to perform the suggested improvement, (2) possibility of performing it at the time, and (3) desirability of making the improvement. Third, it includes the choice of improvement. This includes pupils' expressing a preference for or against particular suggested improvements. Fourth, it includes the consummation of improvement. This includes pupils performing the improvement chosen to effect. The procedure of pupil judging involves, in this sense, the following steps:

PROCEDURE IN PUPIL JUDGING

I. Initiation of Improvement
II. Evaluation of Improvement
III. Choice of Improvement
IV. Consummation of Improvement

3. **Successful Pupil Judging.** Judging involves, as we have seen, the initiation of improvement, evaluation of improvement, choice of improvement and consummation of improvement. These are the traits of judging. The functioning of each trait includes the pupil's response along its drive for the stimulus-response mechanisms involved in each trait function in this manner. The functioning of the stimulus-response mechanisms, for example, in the initiation of improvement involves the pupil responding along its drive in suggesting improvements in pursuing particular goals. The same is equally true in case of the other traits of judging. Successful judging is, in this sense, the pupil responding along its drive consecutively in the initiation, evaluation, choice, and consummation of improvements. It is, in other words, the pupil itself performing each of these steps in this order.

4. **Guidance in Pupil Judging.** Pupil judging involves, as we have seen, response along drive in the initiation, evaluation, choice, and consummation of improvement. It involves, as such, guidance, for, as we have seen, the response of boys and girls along their drive depends, in every instance, upon stimulation and direction. Guidance in judging, for this reason, is along two lines. First, it provides stimulation of pupils' response along their drive in the traits of judging. It provides stimuli capable of arousing response of boys and girls along their drive in each of the traits. Second, it provides direction of pupils' response along their drive in the traits of judging. It sees that success attends the response of boys and girls along their drive in each of the traits. Guidance in judging includes, in this sense, stimulation and direction of response of boys and girls along their drive in the initiation of improvement, the evaluation

of improvement, the choice of improvement, and the consummation of improvement.

5. **Guidance and Growth.** Guidance in pupil judging is fundamental for at least two reasons. In the first place, pupil judging depends in every instance upon stimuli capable of arousing response along drive in the traits of judging. Guidance provides such stimuli and for this reason it is fundamental in pupil judging. In the second place, pupil judging depends upon direction of the response of boys and girls along their drive in the traits of judging. Guidance provides such direction. It sees that success attends pupils' response along their drive in each of the traits and is for this reason fundamental in pupil judging. Guidance is, in this sense, paramount in pupil judging for without it the response of boys and girls along their drive in the traits would be thwarted in many instances because of a lack of proper stimuli or proper aid. Successful pupil judging contemplates a teacher in every instance for the function of the teacher is, as we have seen, to afford boys and girls guidance along this line. The teacher provides, on the one hand, stimuli capable of arousing pupils' response along their drive in the several traits of judging and, on the other hand, provides aid in enabling them to respond successfully along each of the traits.

6. **Stimulation in Pupil Judging.** Stimulation of pupil judging includes, as we have seen, stimuli capable of stimulating the response of boys and girls along their drive in the traits of judging. It takes place through the teacher providing such stimuli. The two points that guide the teacher in providing stimuli for the other traits of purposive behavior prevail here. In the first place, the stimulation should be varied because of individual differences in boys and

girls. In the second place, the stimulation should be along the five lines of purposive behavior. It should include stimuli capable of arousing the response of boys and girls along their drive in the judging of Excursion, Construction, Play, Communication, and Skill Activities. Stimulation of pupil judging includes, in this sense, a wide range of stimuli along the following lines:

I. *Stimulation in Construction Judging.* Books, bulletins, pictures, designs, and models dealing with completed projects in wood, metal, textiles, clay, paper, yarn, leather, cardboard, raffia, reed, paint, water colors, crayola, foods, and type.

II. *Stimulation in Communication Judging.* Story books in English, French, German, etc., dealing with completed projects in dramatization, story telling, reading, and short story writing.

III. *Stimulation in Excursion Judging.* Books, bulletins, and pictures dealing with the study of community occupations, industries, plant and animal life, field and forest, and earth and sky.

IV. *Stimulation in Play Judging.* Books, bulletins, pictures, and designs dealing with completed projects in indoor and outdoor games and contests, such as volley ball, basketball, tennis, hockey, track, tenpins, checkers, etc.

V. *Stimulation in Skill Judging.* Books, bulletins, pictures, charts, and models dealing with completed projects in handwriting, dancing, composition, debating, typewriting, singing, etc.

7. **Direction in Pupil Judging.** Direction involves, as we have seen, teacher aid in pupils' initiation, evaluation, choice, and consummation of improvement. It sees, in other words, that success attends the response along their drive in the face of difficulties in each of these steps. Direction,

in this sense, is along four lines. The first line involves direction in the initiation of improvement. This includes aid on the part of the teacher in the pupil's discovery of changes (1) in the choice of processes included in a plan, e.g., elimination, substitution, addition, or modification of the processes, and (2) in execution of the processes included in a plan, e.g., performance of a neglected process. This includes specifically, say, in making a book rack, at least the following teacher aids:

I. *Direction in Initiation of Improvement*

(a) Helping the pupil, if necessary, to find books, bulletins, pictures, designs, and models dealing with the processes—their organization and execution—included in the completed book rack activity.
(b) Helping the pupil, if necessary, to find out what parts of the study sources to study in finding out what changes should be made in the choice, organization, and execution of the processes in making a book rack.
(c) Helping the pupil, if necessary, to overcome any difficulty arising in the reading and interpreting the several study sources.
(d) Helping the pupil, if necessary, to point out needed changes (1) in the choice of processes—elimination, substitution, addition, or modification, and (2) in execution of processes in performance or neglected processes included in making a book rack.
(e) Helping the pupil, if necessary, to make a list of needed changes, (1) in the choice of processes—elimination, substitution, addition, or modification, and (2) in execution of processes in performance of neglected processes involved in making a book rack.

II. *Direction in Evaluation of Improvement.* The second line involves direction in the evaluation of improvement.

This includes aid on the part of the teacher in the pupil's study of (1) how to perform the suggested improvement, (2) possibility of performing the improvement at the time, and (3) desirability of making the suggested improvement. This includes specifically the following teacher aids in making the book rack:

(a) Helping the pupil, if necessary, to find books, bulletins, pictures, and models dealing with (1) how to perform the suggested improvements, (2) possibility of performing them, and (3) desirability of performing the improvements.

(b) Helping the pupil, if necessary, to find the parts of the study sources dealing with the suggested improvements.

(c) Helping the pupil, if necessary, to overcome any difficulty occurring in reading and interpreting the several study sources.

(d) Helping the pupil, if necessary, to point out specifically (1) how to perform each suggested improvement, (2) possibility of performing each suggested improvement at the time, and (3) desirability of performing the improvements.

III. *Direction in Choice of Improvement.* The third line involves direction in choice of improvement. This includes aid on the part of the teacher in the pupil's writing out the changes considered necessary, (1) in choice of processes—elimination, substitution, addition, or modification, and (2) in execution of processes—performance of neglected processes. This includes specifically the following teacher aids in making the book rack:

(a) Helping the pupil, if necessary, to write out a list of changes considered necessary (1) in choice of processes—elimination, substitution, addition, or modification, and (2) in execution of processes—performance of neglected processes.

(b) Helping the pupil, if necessary, to overcome any difficulty in handwriting, spelling, and calculation involved in listing the several improvements.

IV. *Direction in Consummation of Improvement.* The fourth line involves direction in consummation of improvement. This includes aid on the part of the teacher in the pupil's performance of the improvement chosen to effect. It includes the following teacher aids in the instance of a pupil performing the added process (improvement) of countersinking the nail heads in making a book rack:

(a) Helping the pupil, if necessary, to secure the tools needed in countersinking nail heads.
(b) Helping the pupil, if necessary, to find out how deep in the wood to countersink the nail heads.
(c) Helping the pupil, if necessary, to experiment in countersinking nail heads before countersinking the nail heads in the book rack.

Direction in pupil judging is, in this sense, enabling boys and girls to respond successfully along their drive in the face of difficulties in the initiation, evaluation, choice, and consummation of improvement. In this sense it is extremely varied. In one instance it may be the teacher aiding a pupil to respond along its drive in the face of difficulty in the initiation of improvement; in another instance it may be the teacher aiding a pupil in the evaluation of improvement; in still another instance it may be the teacher aiding a pupil to respond along its drive in choice of improvement, and so on for all the different pupils and different traits of improvement, and so on for all the different pupils and different traits of judging. Direction is, in this sense, along all the traits of judging for each of the five lines of purposeful activity. It includes, in other words, direction in the response of boys and girls along their drive in the initiation, evaluation, choice, and consummation of improvement in Excursion Activities, Construction Activities, Story Activities, Play Activities, and Skill Activities.

8. **Teaching Procedure in Pupil Judging.** Pupil judging involves, as we have seen, four interrelated steps. It involves, in every instance, the initiation of improvement, the evaluation of improvement, the choice of improvement, and the consummation of improvement. The school procedure should provide for each of these steps. It should provide opportunity for each pupil to suggest the improvements it considers necessary to complete the chosen goal. As the improvements are suggested, in case of group activity, they should be recorded on the blackboard for further consideration. This is initiation of improvement. In the second place, the school procedure should afford opportunity for each pupil to study and discuss the desirability and practicability of the suggested improvements. This includes a study and discussion of (1) how to perform the suggested improvement, (2) possibility of performing the suggested improvement at the time, and (3) desirability of performing the suggested improvements. This is evaluation of improvement. In the third place, the school procedure should provide opportunity for each pupil to express a preference for or against the use of the suggested improvement on the basis of the evaluation. In case of group activity, a majority of the pupils expressing a preference for a particular improvement should control in the choice of improvements to effect. This is choice of improvement. In the fourth place, the school procedure should provide opportunity for each pupil

to perform the chosen improvements. This involves effecting the improvements at the time. This is consummation of improvement. In brief, the teaching procedure should provide for the following steps:

TEACHING PROCEDURE IN CHILD JUDGING

I. Stimulate and direct boys and girls to suggest improvements considered necessary to complete the activity under way.
II. Stimulate and direct boys and girls to study and discuss the desirability and practicability of the suggested improvements.
III. Stimulate and direct boys and girls to express a preference for or against the suggested improvements.
IV. Stimulate and direct boys and girls actively to perform at the time the improvements chosen to effect.

This procedure is applicable to both individual and group activities. It differs only in the number that participates in each step. In individual activity the procedure involves an individual pupil and the teacher, while in group activity it involves a group of pupils and the teacher. In either case, the function of the teacher is stimulation and direction of the response of boys and girls along their drive in each of the traits of judging. The teacher provides, in the first place, stimuli capable of stimulating the response of boys and girls along their drive in each trait, and in the second place, sees that success attends their response in each of the traits. This is guidance in pupil judging.

9. Illustration of Teaching Procedure in Judging. The teaching procedure in judging includes two major parts. The first part includes making available stimuli conducive to response of pupils along their drive in the traits of judging. This step demands that the teacher do two things. First, it demands that the teacher familiarize herself with stimuli conducive to response of pupils along their drive in the initiation, evaluation, choice, and consummation of improvement. This involves study of available stimuli as compared with what they should be. Second, it demands making available stimuli conducive to response of pupils along their drive in the traits of judging. This involves making available such stimuli in school.

The second part includes direction in enabling pupils to respond successfully along their drive in the traits of judging. This demands that the teacher provide aid along two major lines. First, it demands that the teacher provide opportunity for each pupil to respond along its drive in the initiation, evaluation, choice, and consummation of improvement. This involves making it possible for each pupil to participate along each of these lines. Second, it demands that the teacher aid each pupil individually in overcoming any difficulty encountered along the traits of judging. This demands that the teacher see that success attends pupils along these lines. The following illustrates concretely the teaching procedure for each of the traits of judging in the Excursion activity. The first procedure provides stimulation and direction of a group of boys and girls in the initiation of improvement in the study of how ice is made; the second provides stimulation and direction in the evaluation of improvement; the third provides stimulation and direction in the choice of improvement; and the fourth provides stimulation and direction in the consummation of improvement in this activity.

TEACHING PROCEDURE

ACTIVITY How Mr. Smith Makes Our Ice GRADE 9th DATE April 27th NUMBER 1

DIFFICULTY	*PROCEDURE*		*IMPROVEMENT*	
	STIMULATION	*DIRECTION*	*SOUGHT*	*OBTAINED*
Drive and Response on part of all pupils in the Initiation of Improvements.	1. See that each pupil has a written copy of the things selected to find out (listed in teaching procedure of April 4th), the sources of information (listed in teaching procedure of April 4th), and the procedure of study (listed in the teaching procedure of April 10th).	1. Provide opportunity for the pupils to go over the (1) things to find out, (2) sources of information, and (3) procedure of study with a view to making a written list of improvements in any one of all. Aid individually John, Lucile, James, and Sam in making their written lists of improvements. 2. Aid pupils, if necessary, in overcoming any difficulties (spelling, handwriting, English, etc.) in making the list. 3. Provide opportunity for each pupil to suggest improvements.	Drive and Response on part of: a) John b) Lucile c) James d) Sam	 1 1

TEACHING PROCEDURE

ACTIVITY How Mr. Smith Makes Our Ice GRADE 9th DATE April 30th NUMBER 2

DIFFICULTY	PROCEDURE		IMPROVEMENT	
	STIMULATION	DIRECTION	SOUGHT	OBTAINED
Drive and Response on part of all pupils in the Evaluation of Improvements.	1. Write on the blackboard the improvements suggested by the pupils as follows: a) Collect more information on how ice is frozen b) Collect more information on machinery used c) Collect more information on how ice is kept	1. Provide pupils opportunity to study reference material with a view to finding out what the suggested improvements include and possibility of doing them. Aid individually John, Lucile, and Fred in studying the material.	Drive and Response on part of: a) John b) Lucile c) Fred	1
	2. Provide pupils with the following books and bulletins: a) How ice is made b) Hessler: General Science c) The Book of Knowledge, Vol. X	2. Provide pupils opportunity to discuss what the suggested improvements include and possibility of carrying them out. Aid individually John, Lucile, and Fred in using their notes in carrying on the discussion.		

TEACHING PROCEDURE

ACTIVITY How Mr. Smith Makes Our Ice GRADE 9th DATE May 2nd. NUMBER 3

DIFFICULTY	*PROCEDURE*		*IMPROVEMENT*	
	STIMULATION	*DIRECTION*	*SOUGHT*	*OBTAINED*
Drive and Response on part of all pupils in Choice of Improvement.	1. Write on the blackboard the improvements suggested by the pupils as follows:	1. Provide opportunity for pupils to express a choice for particular improvements to effect. Aid individually Lucile, Fred, and James.	Drive and Response on part of:	
	a) Collect more information on how ice is frozen.		a) Lucile	1
	b) Collect more information on machinery used.	2. Aid pupils, if necessary, in writing out properly the improvements selected to effect.	b) Fred	1
	c) Collect more information on how ice is kept.		c) James	

TEACHING PROCEDURE

ACTIVITY How Mr. Smith Makes Our Ice GRADE 9th DATE May 5th NUMBER 4

DIFFICULTY	PROCEDURE		IMPROVEMENT	
	STIMULATION	DIRECTION	SOUGHT	OBTAINED
Drive and Response on part of all pupils in the Consummation of Improvement	1. See that each pupil has a written plan of the improvement as follows: a) Visit Mr. Smith's ice plant to collect information on: 1) How ice is frozen 2) Kind of machinery used b) Study the following material: 1) How ice is made (bulletin) 2) Kind of machinery used	1. Provide opportunity for the pupils to visit Mr. Smith's ice plant to collect information on (1) How ice is frozen and (2) Kind of machinery used. 2. Provide opportunity for pupils to study the reference material for the purpose of collecting information on things to find out. Aid James individually in studying the material. 3. Provide opportunity for pupils to discuss information collected with a view to discovering particular conclusions regarding things selected to find out.	Response on the part of: a) James	1

CHAPTER XIX

HOW TO MEASURE GUIDANCE OF PURPOSIVE BEHAVIOR

I. Procedure in the Measurement of Guidance

1. Nature of Measurement. Teaching is guidance and guidance includes, as we have seen, stimulation and direction of the response of boys and girls along their drive in the initiation, evaluation, and choice of goal; initiation, evaluation, and choice of means; execution of means; and initiation, evaluation, choice, and consummation of improvement. To measure guidance, thus, demands measurement of the response of boys and girls along their drive in these traits. It does for at least two reasons. In the first place, drive is a measure of the appropriateness of stimulation. The response of boys and girls along their drive in any trait of purposeful activity depends, as we have seen, upon appropriate stimulation. It depends, in other words, upon stimuli capable of arousing the response of boys and girls along their drive in the traits of purposeful activity. Drive is, in this sense, a measure of the appropriateness of stimulation along any particular trait of purposive behavior. In the second place, response is a measure of the appropriateness of direction. Successful response of boys and girls along their drive in any particular trait of purposive behavior depends upon appropriate direction. It depends, in other words, upon aid in enabling boys and girls to respond successfully in the face of difficulties arising along the traits of purposive behavior. Response is, in this sense, a measure of the appropriateness of direction along any trait of purposive behavior. Measurement of guidance should, in addition, fulfil two other conditions. First, it should be a quantitative measure of guidance. Quantitative measurement is, in all probability, the most reliable measure of the appropriateness of the teacher's stimulation and direction along the traits of purposive behavior. Second, it should express progress in guidance. It should indicate in this particular improvements in the teacher's stimulation and direction along the traits of purposive behavior for the primary value of the measurement of guidance is the extent to which it indicates continuous progress in guidance of the purposive behavior of boys and girls. Any proposed scale for measuring guidance should fulfil all of these conditions. First, it should measure the drive and response of boys and girls along the traits of purposive behavior, for drive is a measure of the appropriateness of the teacher's stimulation and response is the measure of the appropriateness of the teacher's direction. It should be a behavior scale. Second, it should express results in quantitative terms, for quantitative measurement is the most reliable measurement of the appropriateness of the teacher's stimulation and direction. It should be a quantitative scale. Third, it should express progress for diagnosis of improvements in the teacher's stimulation and direction along the traits of purposive behavior is the primary purpose of the measurement of guidance. It should be a progress scale.

2. *The Behavior Scale as a Measure of Guidance.* The Behavior Scale for Measuring Purposive Behavior satisfies

these conditions.[1] It measures, in the first place, the drives and responses of boys and girls along the traits of purposive behavior. It measures as a result the appropriateness of teacher stimulation and direction of purposive behavior. In the second place, it expresses the drives and responses of boys and girls along the traits of purposive behavior in quantitative terms. It expresses the extent of appropriateness of the teacher's stimulation and direction along any particular trait of purposive behavior in terms of the Drive and Response Indexes. The Behavior Scale is, in this sense, a quantitative measure of the teacher's guidance of the purposive behavior of boys and girls. The Behavior Scale is in three parts. The first part includes provision for scoring individual pupils along each of the traits of purposive behavior. Space is provided for recording the drives and responses of each pupil along each of the traits of purposeful activity. This part is designated as the Activity Score Card since it indicates the scores of boys and girls engaging in purposive behavior. The second part includes provision for expressing the drives and responses of individual pupils along each of the traits of purposive behavior in quantitative terms. Space is provided for recording the Drive and Response Indexes for individual pupils along each of these traits. This part is designated as the Activity Index Card since it indicates the extent of purposive behavior prevailing in the conduct of individual boys and girls. It is a measure of the appropriateness of the teacher's stimulation and direction. The third part includes provision for expressing the drives and responses of boys and girls along each of the traits of purposive behavior. This part is designated as the Activity Chart since it expresses the status of each pupil's conduct. It reveals progress in the teacher's stimulation and direction. These parts are shown in Chapter XXI together with directions, explanations, illustrations, and tests for each of the traits of purposive behavior.

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[1] For a discussion of the Scale, see Chapter XXI.

3. *Scale Scoring.* Scale scoring involves counting the particular drives and responses functioning in the purposive behavior of boys and girls. It involves in this sense three conditions. In the first place, scoring drives and responses should take place at the time they function in the conduct of boys and girls for in no other way is it possible to measure them objectively. Response in initiation of goal, for example, should be counted at the time it functions in the conduct of boys and girls. In the second place, scoring should indicate the number of drives and responses functioning in the several traits of purposive behavior. Drive in initiation of goal, for example, should be recorded under the behavior trait; initiation of goal; response in initiation of means under the behavior trait, initiation of means, etc. In the third place, scoring should indicate the particular drives and responses functioning in the behavior of each individual pupil participating in an enterprise. This necessitates counting the drives and responses of each individual boy and girl. Scale scoring in this sense involves counting each drive and response functioning in the conduct of each individual boy and girl. The tally mark probably is the most practical device for recording particular drives and responses along the traits of purposive behavior.

4. *Scale Indexes.* The scale scores reveal the status of each pupil's drives and responses functioning in purposive behavior. They reveal, in the first place, the number of drives functioning in the case of each individual boy and girl. They indicate, in other words, the number of volun-

tary responses (drives) and involuntary responses. The scale score in this sense reveals the ratio between the voluntary and involuntary responses for each individual boy and girl for each of the several traits of purposive behavior. This ratio is expressed in terms of the Drive Index. In so doing it expresses quantitatively the appropriateness of the teacher's stimulation.

In the second place the scale scores reveal the status of each pupil's response functioning in purposive behavior. They reveal the number of responses made by each pupil as well as the total number of responses made in the consummation of an enterprise. They indicate, in this sense, the ratio between each pupil's responses and the total number of responses made in carrying forward successfully an enterprise. This ratio is expressed in terms of the Response Index. It expresses in a single term the appropriateness of the teacher's direction.

5. *Drive Index Formula.* The Drive Index, as we have seen, is a quantitative term expressing the appropriateness of the teacher's stimulation along the traits of purposive behavior. It is obtained by dividing the total number of a pupil's drives (voluntary response) in a trait by the total number of its responses made in carrying forward the trait successfully. The formula is:

$$\text{Drive Index equals } \frac{\text{PD}}{\text{PR}} \times 100$$

(PD is symbol for pupil drive; PR is symbol for pupil response.)

The formula is the same for both individual and group activity. A Drive Index of 100 in either instance is ideal. It indicates appropriate stimulation on the part of the teacher. The following illustrates the method for computing the Drive Index. Suppose Willie's score shows a total of 300 drives and 300 responses in the execution trait of, say, making a library table. His Drive Index equals to 300 divided by 300 multiplied by 100, giving 100. Willie's Drive Index indicates that all his responses are voluntary in this instance. It is ideal. It indicates his teacher provided appropriate stimulation in this instance.

6. *Response Index Formula.* The Response Index, as we have seen, is a quantitative term expressing the appropriateness of the teacher's direction along the traits of purposive behavior. The formula differs for individual and group activity.

I. The Response Index Formula for Individual Activity

The Response Index for individual activity is obtained by dividing the responses actually made by a pupil in a trait by the total number of responses made in carrying forward the trait successfully. The formula is:

$$\text{Response Index equals } \frac{\text{PR}}{\text{PR} + \text{TR}} \times 100$$

(PR is symbol for pupil response; TR is symbol for teacher response.)

A Response Index of 100 is ideal. It indicates appropriate direction on the part of the teacher. The following illustrates the method for computing the Response Index for an individual activity: Suppose Willie's score shows he made 300 responses in the execution trait of, say, making a library table, and that there were 300 responses involved in the successful performance of this trait. His Response Index is equal to 300 divided by 300 multiplied by 100, giving 100. Willie's Response Index thus indicates that he made all of the responses in the execution trait in making the library table. It indicates his teacher provided appropriate direction in this instance.

II. The Response Index Formula for Group Activity

The Response Index for group activity is obtained by dividing the responses actually made by a pupil in a trait by the mean group response made by all pupils participating in the trait. The formula is:

$$\text{Response Index equals } \frac{PR}{MR} \times 100$$

(PR is symbol for pupil response; MR is symbol for the mean group response.)

A Response Index of 100 is ideal for a group of boys and girls of similar ability. It indicates that each pupil participating in a trait of group activity made his share of the responses needed in its successful consummation. The following illustrates the method for computing the Response Index for group activity: Suppose John made 100 responses in the execution trait of a group activity, say, How Our Ice Is Made, Mary 50, Carl 150, Bill 100, and Tom 100. The mean group response is 100. The Response Index for each pupil in this trait is as follows:

$$\text{John's R. I. equals } \frac{100}{100} \times 100 \text{ or } 100$$

$$\text{Mary's R. I. equals } \frac{50}{100} \times 100 \text{ or } 50$$

$$\text{Carl's R. I. equals } \frac{150}{100} \times 100 \text{ or } 150$$

$$\text{Bill's R. I. equals } \frac{100}{100} \times 100 \text{ or } 100$$

$$\text{Tom's R. I. equals } \frac{100}{100} \times 100 \text{ or } 100$$

John's, Bill's, and Tom's Response Indexes are ideal. Each made his share of the responses in this trait. They indicate their teacher succeeded in providing appropriate direction. Mary's Response Index is 50 below the ideal. She made only one-half of her share of the responses. Carl's Response Index is 50 above the ideal. He made one-half more than his share of the responses in the trait. These indexes indicate the teacher failed to provide appropriate direction for Mary and Carl.

7. Scale Uses. The Behavior Scale yields at least two major analyses of guidance. In the first place, it reveals successes and failures in the teacher's stimulation of purposive behavior. It reveals success and failure in the sense it indicates the appropriateness of a stimulus provided boys and girls in responding along their drive in the traits of purposive behavior. Success and failure in stimulation are indicated by the Drive Indexes. High Drive Indexes, on the one hand, indicate successes in stimulating the response of boys and girls along their drive in the traits of purposive behavior. They indicate the teacher provides stimuli capable of stimulating the responses of boys and girls along their drive in the several traits of purposive behavior. Low Drive Indexes, on the other hand, indicate failure in stimulating the response of boys and girls along their drive in the traits of purposive behavior. They indicate failure to provide stimuli capable of stimulating the response of boys and girls along their drive in the several traits of purposive behavior. In the second place, the Behavior Scale reveals successes and failures in the teacher's direction of purposive behavior. It reveals successes and failures in the sense it indicates the appropriateness of aid provided boys and girls in responding along their drive in the traits of purposive behavior. Successes and failures in direction are indicated by the Response Indexes. High Response Indexes, on the one hand, indicate successes in directing the response of boys and girls along their drive in the traits of purposive behavior. They indicate the teacher provides appropriate aid in enabling boys and girls to respond successfully along the several traits of purposive behavior. Low Response Indexes indicate, on the other hand, failures in direction of the response of boys and girls along their drives in the traits of purposive behavior. They indicate failure to provide appropriate aid in enabling boys and girls to respond successfully along their drive in the traits of purposive behavior. The two major analyses of guidance thus are:

1. Successes and failures in stimulating purposive behavior.
2. Successes and failures in directing purposive behavior.

8. *Lines of Measurement.* Measurement of guidance may be along any one of three lines. The first line yields successes and failures in the teacher's stimulation and direction of the responses of boys and girls along their drives in particular traits of purposive behavior. The Drive and Response Indexes for particular traits, say, initiation of goal, initiation of means, and initiation of improvement, reveal successes and failures in guidance along this line. The Drive Indexes, on the one hand, reveal to what extent boys and girls voluntarily engage in particular traits of purposive behavior. They measure, in this sense, the appropriateness of the teacher's

stimulation along these traits. The Response Indexes, on the other hand, reveal to what extent boys and girls actually engage in particular traits of purposive behavior. They measure, in this sense, the appropriateness of the teacher's direction along these traits. The second line yields successes and failures in the teacher's stimulation and direction of the response of boys and girls along their drive in a selected combination of traits of purposive behavior. The Drive and Response Indexes for a selected combination of traits, say, initiation of means, evaluation of means, and choice of means, reveal successes and failures in guidance along this line. The Drive Indexes, on the one hand, reveal to what extent boys and girls voluntarily engage in a selected combination of traits of purposive behavior. They measure, in this sense, the appropriateness of the teacher's stimulation along these traits. The Response Indexes, on the other hand, reveal to what extent boys and girls actually engage in a selected combination of traits of purposive behavior. They measure, in this sense, the appropriateness of the teacher's direction along these traits. The third line yields successes and failures in stimulation and direction of the response of boys and girls along their drive in all the traits of purposive behavior. The Drive and Response Indexes of each pupil for all the traits of purposive behavior reveal successes and failures along this line. The Drive Indexes, on the one hand, reveal to what extent boys and girls voluntarily engage in each of the traits of purposive behavior. They indicate, in other words, the extent to which boys and girls engage in complete acts. They measure, in this sense, the appropriateness of the teacher's direction along each of the traits of purposive behavior. Briefly, the lines of measurements are:

1. Measurement of successes and failures in the teacher's stimulation and direction of response of boys and girls along their drive in particular traits of purposive behavior.
2. Measurement of successes and failures in the teacher's stimulation and direction of the response of boys and girls along their drive in a selected combination of traits of purposive behavior.
3. Measurement of successes and failures in the teacher's stimulation and direction of the response of boys and girls along their drive in all the traits of purposive behavior.

9. Conditions of Measurement. The primary condition of measurement of guidance is that such analysis should take place at the time and place boys and girls participate in enterprises. This condition is demanded for two reasons. First, measurement of drives and responses along the traits of purposive behavior is possible only at the time and place they function in the conduct of boys and girls. They manifest themselves only in conduct. Second, objective measurement is possible only at the time and place drives and responses function in conduct of boys and girls. They are observable only as they function in carrying forward particular enterprises.

Other conditions are demanded. Normal conditions should prevail at the time and place measurement of drives and responses of boys and girls take place. Interference on the part of the supervisor or teacher should be avoided. The supervisor, for example, should avoid all unnecessary disturbances such as speeches, conspicuous movements, or participation in the enterprise. The teacher should likewise avoid any disturbance, such as, for example, reminding boys and girls that they should do their best, or that they will be measured on a certain day. All such disturbances upset the normal conditions that should obtain in the schoolroom at the time measurement takes place. Boys and girls should be permitted, in other words, to go about their work in a natural and normal way without any notion that they are being measured at the time. In addition the physical conditions of the schoolroom should be normal. Temperature, ventilation, etc., should be normal at all times.

10. Procedure of Measurement. Following are the steps normally prevailing in the measurement of guidance:

(a) *Line of Measurement.* Decide on the line of measurement, i.e., whether measurement is to reveal successes and failures in the teacher's stimulation and direction of particular traits, selected combination of traits, or all traits of purposive behavior.

(b) *Type of Activity.* Determine the type of activity, i.e., whether Excursion Activity, Communication Activity, Play Activity, Construction Activity, or Skill Activity.

(c) *Preparing the Score Card.* Fill in the name of the activity, boys and girls, teacher, grade, and date in the places provided on the Activity Score Card. Use the first name of boys and girls and arrange in alphabetical order. Write name of teacher at bottom of list.

(d) *Scoring.* Visit the classroom and score each pupil's drive and response (also the teacher's) along the traits selected to measure.

(e) *Preparing the Index Card.* Fill in the name of the activity, boys and girls, teacher, grade, and date in the spaces provided on the Activity Index Card. Use the first name of the boys and girls and arrange in alphabetical order. Write name of teacher at bottom of list.

(f) *Computation of Indexes.* Compute the Drive Index and the Response Index for each pupil and the teacher along the traits selected to measure and record on the Activity Index Card.

(g) *Preparing the Activity Chart.* Fill in the name of the activity, pupil, teacher, and date in the spaces provided on the Activity Chart. Prepare a chart for each pupil and the teacher engaging in the activity.

(h) *Charting the Indexes.* Chart the Drive Index and the Response Index for each pupil and the teacher along the traits selected to measure on the Activity Chart. Use a broken line to chart the Drive Indexes and an unbroken line for the Response Indexes.

(i) *Success and Failure Inventory.* Study the Activity Chart of each pupil and the teacher and list the successes and failures in guidance revealed. State the successes in terms of successful stimulation and direction for each pupil along the traits measured; state the failures in terms of unsuccessful stimulation and direction for each pupil along the traits measured.

11. Importance of Measurement. Measurement of guidance reveals, as we have seen, appropriateness of the teacher's stimulation and direction of the purposive behavior of boys and girls. It indicates, in the first place, the appropriateness of stimulation. The Drive Index indicates successes and failures in stimulation. High Drive Indexes, on the one hand, indicate successes; low Drive Indexes, on the other hand, indicate failures. In the second place, it indicates the appropriateness of direction. The Response Index indicates successes and failures in direction. High Response Indexes, on the one hand, indicate successes; low Response Indexes, on the other hand, indicate failures. This is important for at least two reasons. First, it is the only possible way for the teacher to discover the appropriateness of stimulation and direction provided boys and girls in a particular enterprise. It is the only reliable way the teacher may know her successes and failures in any particular instance. Second, it is the only possible way for the teacher to discover progress in providing appropriate stimulation and direction for boys and girls. It is the only reliable way the teacher may know whether she is improving in stimulating and directing the purposive behavior of boys and girls. The importance of measurement of guidance may be summarized as follows:

I. Measurement of guidance includes the teacher's successes and failures in stimulation and direction of boys and girls in any particular activity.
II. Measurement of guidance includes progress in the teacher's stimulation and direction of boys and girls in continuous activities.

II. *Illustration of the Measurement of Guidance*

1. Line of Measurement. There are, as we have seen, three lines of the measurement of guidance. The first line yields successes and failures in the teacher's stimulation and direction of the responses of boys and girls along their drive in particular traits of purposive behavior. The Drive and Response Indexes for a particular trait, say, initiation of goal, reveal successes and failures in guidance along this line. The second line yields successes and failures in the teacher's stimulation and direction of the response of boys and girls along their drive in a selected combination of traits of purposive behavior. The Drive and Response Indexes for a selected combination of traits, say, initiation of means, evaluation of means, and choice of means, reveal successes and failures in guidance along this line. The third line yields successes and failures in the teacher's stimulation and direction of the response of boys and girls along their drive in all the traits of purposive behavior. The Drive and Response Indexes for each of the several traits reveal successes and failures along this line. The third line of measurement was selected by the teacher in this illustration, namely, successes and failures in stimulation and direction along all the traits of purposive behavior.

2. *Type of Activity.* There are, as we have seen, five lines of purposive behavior. They are: The Excursion Activity, The Communication Activity, the Construction Activity, the Play Activity, and the Skill Activity. The Communication Activity was selected by the teacher in this illustration, namely, the dramatization of the Gingerbread Man story.

3. *Preparing the Activity Score Card.* The Activity Score Card includes, in the first place, the traits of purposive behavior. These traits are listed horizontally at the top of the card. In the second place, it includes the Drive and Response arranged vertically in the form of "D" and "R" for each of the traits. Space is also provided on the card for the names of pupils, teacher, activity, date, grade, and scores.

The teacher filled in the names of the pupils in alphabetical order, activity, grade, and date in the places provided on the Activity Score Card. The Activity Score Card used in the dramatization of the Gingerbread Man story is shown in Figure 10.

4. *Scoring Drives and Responses.* Response is the participation of a pupil along the traits of purposive behavior. It is seen in the pupil's overt participation in the initiation of goal, evaluation of goal, choice of goal, initiation of means, evaluation of means, choice of means, execution of means, initiation of improvement, evaluation of improvement,

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		ACTIVITY TRAITS										
Pupils	Drive and Response	Initiation of Goal	Evaluation of Goal	Choice of Goal	Initiation of Means	Evaluation of Means	Choice of Means	Execution of Means	Initiation of Improvement	Evaluation of Improvement	Choice of Improvement	Consummation of Improvement
Betty	D	/	/	/	/////	/	////	///////	//	/	///	/
	R	/	/	/	/////	/	////	///////	//	/	///	/
Bobby	D	/	/	/	////	/	////	////////	//	/	//	/
	R	/	/	/	////	/	////	////////	//	/	//	/
Carl	D	/	/	/	////	/	////	/////////	//	/	//	/
	R	/	/	/	////	/	////	/////////	//	/	//	/
Carrie	D	/	/	/	/////	/	////	////////	//	/	///	/
	R	/	/	/	/////	/	////	////////	//	/	///	/
Doris	D	/	/	/	/////	/	////	/////////	//	/	////	/
	R	/	/	/	/////	/	///	/////////	//	/	////	/
Donald	D	/	/	/	/////	/	////	/////////	//	/	////	//
	R	/	/	/	/////	/	////	/////////	//	/	////	//
Fred	D	/	/	/	/////	/	///	/////////	//	/	////	/
	R	/	/	/	/////	/	///	/////////	//	/	////	/
Gay	D	/	/	/	///	/	////	////////	//	/	///	/
	R	/	/	/	////	/	////	////////	//	/	///	/
Iona	D	/	/	/	/////	/	////	/////////	/	/	///	/
	R	/	/	/	/////	/	////	/////////	/	/	///	/
Iola	D	/	/	/	//////	/	////	//////////	///	/	///	/
	R	/	/	/	//////	/	////	//////////	///	/	///	/
John	D	/	/	/	/////	/	////	//////////	//	/	///	/
	R	/	/	/	/////	/	////	/////////	//	/	///	/
Jim	D	/	/	/	/////	/	////	////////	//	/	///	/
	R	/	/	/	/////	/	////	////////	//	/	///	/
Julia	D	/	/	/	/////	/	////	/////////	/	/	///	/
	R	/	/	/	/////	/	////	/////////	/	/	///	/
Mary	D	/	/	/	/////	/	////	//////////	//	/	///	/
	R	/	/	/	/////	/	////	//////////	//	/	///	/
Ned	D	/	/	/	//////	/	////	////////	//	/	///	/
	R	/	/	/	//////	/	////	////////	//	/	///	/
Nadine	D	/	/	/	////	/	////	/////////	//	/	///	/
	R	/	/	/	////	/	////	/////////	//	/	///	/
Opal	D	/	/	/	/////	/	////	/////////	//	/	///	/
	R	/	/	/	/////	/	////	////////	//	/	///	/
Ora	D	/	/	/	/////	/	////	////////	//	/	////	/
	R	/	/	/	/////	/	////	////////	//	/	////	/
Pat	D	/	/	/	//////	/	////	/////////	//	/	//	/
	R	/	/	/	//////	/	////	/////////	//	/	//	/
Teacher	D	0	/////////	0	///	////////	0	0	0	/////////	0	0
	R	0	/////////	0	///	////////	0	0	0	/////////	0	0

FIGURE 10.—The Activity Score Card for Scoring the "Gingerbread Man" Story.

choice of improvement, and consummation of improvement. Drive is voluntary participation on the part of the pupil along the traits of purposive behavior. It is seen in the voluntary character of a pupil's response in the initiation of goals, evaluation of goals, choice of goals, initiation of means, evaluation of means, choice of means, execution of means, initiation of improvement, evaluation of improvement, choice of improvement, and consummation of improvement. The teacher records each drive and response at the time they occur in the class work with a tally mark opposite the pupil's name under the appropriate activity trait on the score card. The method of scoring is the same for both individual and group activity.

The teacher recorded with a tally mark the drives and responses of each pupil along all the traits of purposive behavior at the time they occurred in the dramatization of the Gingerbread Man story. The scores are shown in Figure 10.

5. Preparing the Index Card. The Activity Index Card is for recording the Drive and Response Index of each pupil along the traits of purposive behavior. It includes, first, the traits of purposive behavior arranged horizontally across the top of the card, and second, the Drive and Response Indexes arranged perpendicularly on the left side of the card. In addition, space is provided for the names of the pupil, teacher, grade, date, and the Drive and Response Indexes for each trait. The Drive and Response Indexes are recorded in the spaces labeled "D" and "R" following each pupil's name under the appropriate traits.

The teacher filled in the names of the pupils, activity, grade, and date in the places provided on the Activity Index Card for the dramatization of the Gingerbread Man story. This card is shown in Figure 11.

6. Computation of Indexes. There are two formulæ used in computing the Indexes. The first is the Drive Index Formula. It is: D. I. equals $\frac{D}{R} \times 100$. The "D" is a symbol for

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		ACTIVITY TRAITS										
Pupils	Drive and Response Index	Initiation of Goal	Evaluation of Goal	Choice of Goal	Initiation of Means	Evaluation of Means	Choice of Means	Execution of Means	Initiation of Improvement	Evaluation of Improvement	Choice of Improvement	Consummation of Improvement
Betty	D	100	100	100	100	100	100	100	100	100	100	100
	R	100	66	100	100	70	100	75	100	66	100	100
Bobby	D	100	100	100	100	100	100	100	100	100	100	100
	R	100	66	100	80	70	100	100	100	66	66	100
Carl	D	100	100	100	100	100	100	100	100	100	100	100
	R	100	66	100	80	70	100	100	100	66	66	100
Carrie	D	100	100	100	100	100	100	100	100	100	100	100
	R	100	66	100	100	70	100	82	100	66	100	100
Doris	D	100	100	100	100	100	100	100	100	100	100	100
	R	100	66	100	100	70	100	100	100	66	133	100
Donald	D	100	100	100	100	100	100	100	100	100	100	100
	R	100	66	100	100	70	100	100	100	66	133	100
Fred	D	100	100	100	100	100	100	100	100	100	100	100
	R	100	66	100	100	70	75	100	100	66	133	100
Gay	D	100	100	100	75	100	100	100	100	100	100	100
	R	100	66	100	80	70	100	100	100	66	100	100
Dona	D	100	100	100	100	100	100	100	100	100	100	100
	R	100	66	100	100	70	100	100	50	66	100	100
Iola	D	100	100	100	100	100	100	100	100	100	100	100
	R	100	66	100	120	70	100	110	150	66	100	100
John	D	100	100	100	100	100	100	100	100	100	100	100
	R	100	66	100	100	70	100	110	100	66	100	100
Jim	D	100	100	100	100	100	100	100	100	100	100	100
	R	100	66	100	100	70	100	100	100	66	100	100
Julia	D	100	100	100	100	100	100	100	100	100	100	100
	R	100	66	100	120	70	100	110	100	66	100	100
Mary	D	100	100	100	100	100	100	100	100	100	100	100
	R	100	66	100	100	70	100	110	100	66	100	100
Ned	D	100	100	100	85	100	100	100	100	100	100	100
	R	100	66	100	120	70	100	100	100	66	100	100
Nadine	D	100	100	100	100	100	100	100	100	100	100	100
	R	100	66	100	80	70	100	100	100	66	100	100
Opal	D	100	100	100	100	100	100	100	100	100	100	100
	R	100	66	100	100	70	100	100	100	100	100	100
Ora	D	100	100	100	85	100	100	100	100	66	100	100
	R	100	66	100	120	70	100	100	100	100	133	100
Pat	D	100	100	100	100	100	100	100	100	100	100	100
	R	100	66	100	120	70	100	100	100	66	66	100
Teacher	D	0	100	0	100	100	0	0	0	100	0	0
	R	0	600	0	60	570	0	0	0	666	0	0

FIGURE 11.—The Activity Index Card for Scoring the "Gingerbread Man" Story.

the total number of drives obtained by a pupil for any particular trait of purposeful activity. The "R" is a symbol for the total responses obtained by a pupil for any particular trait. For example, John has 5 drives and 5 responses in the initiation of means in the dramatization of Tom Sawyer. His Drive Index is 5 divided by 5 multiplied by 100 giving 100. The second is the Response Index Formula for group activity. It is: R. I. equals $\frac{PR}{MR} \times 100$. The "PR" is a symbol for the total number of responses obtained by a pupil for any particular trait of purposeful activity. The "MR" is a symbol for the mean response of the group for any particular trait of purposeful activity. It is obtained by dividing all the responses made by all the pupils for any particular trait by the number of pupils participating in the trait. For example, John has 5 responses in the initiation of means in the dramatization of Tom Sawyer. The total number of responses obtained by all the pupils and teacher in this trait is 97. The number of pupils' participation is 19. The mean group response in 97 divided by 19 or 5. John's Response Index for the trait is 5 divided by 5 multiplied by 100 giving 100.

The teacher computed the Drive and Response Indexes for each pupil along all the traits in the dramatization of the Gingerbread Man story and recorded the Indexes on the Activity Index Card. The Indexes are shown in Figure 11.

7. *Preparing the Activity Chart.* The Activity Chart is designed for individual pupils. It includes the Drive and Response Indexes for individual pupils along the traits of purposive behavior. It reveals the status of each pupil's participation in an enterprise. The Drive Indexes are charted with a broken line and the Response Indexes are charted with an unbroken line.

The teacher prepared nineteen charts (one for each pupil) for the dramatization of the Gingerbread Man story.

The name of the pupil, activity, grade, and date was filled in in the places provided on the Activity Chart for each pupil participating in the dramatization. The Activity Chart shown in Figure 12 is an illustration of one of the charts prepared in this instance.

8. Charting the Indexes. The Drive and Response Indexes are listed perpendicularly on the left and right sides of the Activity Chart. They range from 0 to 100. The traits of purposive behavior are listed horizontally at the top of the chart. The Drive Indexes are charted by making a small dot at the point where the perpendicular and horizontal lines intersect under each trait, corresponding to the numerical value of the Index for the trait. The small dots are then connected with a broken line. For example, Roy has a Drive Index of 100 for each of the traits in the dramatization of the Gingerbread Man story. A small dot is made on the 100 line under each trait and the dots are connected with a broken line. The Response Indexes are charted in similar fashion except the unbroken line is used in making the chart.

The teacher charted the Drive and Response Indexes for each pupil along all the traits in the dramatization of the Gingerbread Man story. Nineteen charts were made—one for each pupil. The Activity Chart shown in Figure 12 is an illustration of one of the charts.

9. Inventory of Successes and Failures. The Activity Chart yields, as we have seen, two major analyses of guidance. In the first place, it reveals successes and failures in the teacher's stimulation of purposeful activity. Successes and failures in stimulation are indicated by the Drive Indexes of boys and girls. High Drive Indexes, on the one hand, indicate successes. They indicate that the teacher provides boys and girls appropriate stimuli. Low Drive

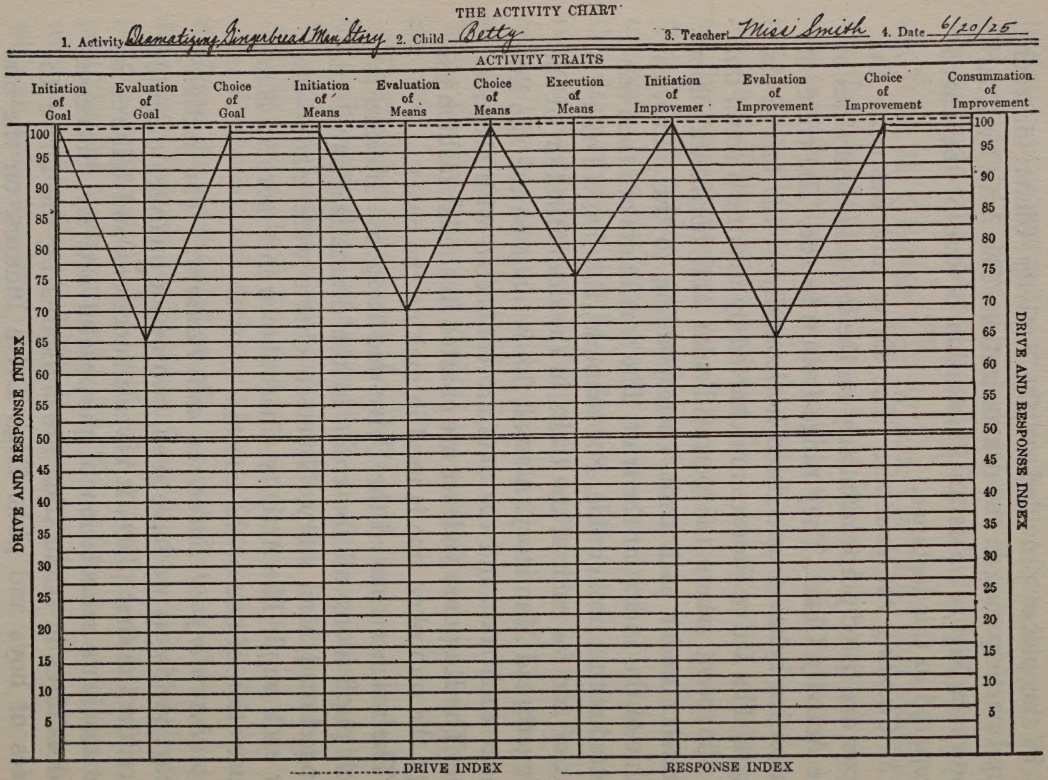

FIGURE 12.—The Activity Chart for Scoring the "Gingerbread Man" Story.

Indexes, on the other hand, indicate failures. They indicate that the teacher fails to provide boys and girls appropriate stimuli. In the second place, the Activity Chart reveals successes and failures in the teacher's direction of purposeful activity. Successes and failures are indicated by the Response Indexes of boys and girls. High Response Indexes, on the one hand, indicate successes in direction. They indicate that the teacher provides boys and girls with appropriate aid. Low Response Indexes, on the other hand, indicate failures in direction. They indicate that the teacher fails to provide boys and girls appropriate aid. The Drive and Response Indexes thus reveal the following analyses of guidance:

1. Successes and failures in stimulating purposeful activity.
2. Successes and failures in directing purposeful activity.

The Drive Indexes shown in the Activity Chart in Figure 12, for example, indicate that the teacher was successful in stimulation. They indicate that the teacher in this instance provided for the pupil appropriate stimuli—appropriate stories. The Response Indexes in this chart indicate that the teacher was successful in direction along all the traits of purposive behavior except the evaluation of goals, initiation of means, execution of means, and evaluation of improvement. The Response Index for each of these traits is slightly above 50 for this pupil. This fact coupled with the high Response Index for the teacher for these traits indicates failure on the part of the teacher in directing this pupil's response along its drive in these traits. The Response Indexes indicate that the teacher failed to provide appropriate aid along these traits. The successes and failures in guidance, in brief, revealed by this chart are as follows. (The Activity Charts for the other pupils engaging in the dramatization of the Gingerbread Man story reveal similar successes and failures in guidance. Only the successes and failures in guidance for one pupil—Betty—are listed below):

I. *Successes in Guidance*

1. Successful stimulation of Betty along all the traits in the dramatization of the Gingerbread Man story.
2. Successful direction of Betty along initiation of goal, choice of goal, initiation of means, choice of means, organization of means, initiation of improvement, choice of improvement, and consummation of improvement in the dramatization of the Gingerbread Man story.

II. *Failures in Guidance*

1. Unsuccessful direction of Betty along evaluation of goal, evaluation of means, execution of means, and evaluation of improvement in the dramatization of the Gingerbread Man story.

PART IV

THE MEASUREMENT OF CHANGES IN PURPOSIVE BEHAVIOR

CHAPTER XX

THE NATURE OF CHANGE IN PURPOSIVE BEHAVIOR

1. **Plurality of Change in Behavior.** Study of the Roly Poly activity indicates many changes resulting in the stimulus-response mechanisms of the children engaging in it. There were, for example, changes in the throwing mechanisms. At the beginning of the game, these mechanisms functioned along the line of throwing balls through a large circle erected perpendicularly on the floor. At the end of the game, they functioned along a quite different line. They functioned along the line of throwing balls at Roly Polys placed on a triangle drawn on the floor. Then there were changes in the marking mechanisms. These mechanisms at the beginning of the game functioned along the line of making straight lines on the blackboard in the form of rectangles of various sizes. At the end of the game, they functioned along the line of making a triangle on the floor. Another marked group of changes took place in the communicating mechanisms. At the beginning of the game, these mechanisms acted along the lines of communicating scores in playing Circle Ball, expressing delight at successful plays in this game, advising others how to play this game, etc. At the end of the Roly Poly game, these mechanisms functioned along the lines of communicating a different type of scores, expressing delight at an entirely different type of playing, advising others along an entirely different line, etc. Then, too, there were

changes in the walking mechanisms, standing mechanisms, grasping mechanisms, etc., etc. Many stimulus-response mechanisms, in short, where changed as a result of the children engaging in this activity. As a result they functioned differently thereafter. The children grew along many lines in the sense that change in the action of many of their stimulus-response mechanisms took place at one and the same time.

2. **Change in Drive and Response of Mechanisms.** In Chapters IX and X we saw that changes in behavior consisted of conditioned stimulus-response mechanisms. The many changes we have just observed in the Roly Poly activity included in every instance a conditioned stimulus-response mechanism. For example, the change in the throwing mechanism consisted of modification of the connection between the response of this mechanism and a new stimulus. This mechanism included at the beginning of the game a connection between the response of throwing balls through a circle erected perpendicularly on the floor. The Roly Poly situation demanded a conditioning of this mechanism in order to engage successfully in the activity. It demanded the formation of a connection between the response of throwing balls and the stimulus of Roly Polys placed on a triangle. Response (Law of Response) of this mechanism along its drive (Law of Drive) to this new stimulus at the time conditioned the mechanism in the sense that instead of the mechanism functioning along the line of throwing balls through a circle it acted along the line of rolling the balls in a straight line toward particular Roly Polys on a triangle. But what does the conditioning of stimulus-response mechanisms involve? What does it involve, for example, in the throwing mechanism?

Conditioning of the throwing mechanism involves, as we have just seen, a change in its functioning along the line of a new stimulus, and in accordance with Chapter VIII (The Conditioned Mechanism) it involves change in the drive and response of this mechanism. In the first place, the throwing mechanism was at the beginning of the game in readiness to respond to the stimulus of circle erected perpendicularly on the floor. At the end of the game this mechanism was in readiness to respond to Roly Polys placed on a triangle. Response (Law of Response) of this mechanism along the line of its drive (Law of Drive) to the new stimulus at the time thus changed its drive in the sense that the mechanism was in a state of readiness to respond along a different line. In the second place, the throwing mechanism included at the beginning of the game the response of throwing balls through a circle erected perpendicularly on the floor. At the end of the game the response of this mechanism included rolling the balls in a straight line toward particular Roly Polys placed on a triangle. Response (Law of Response) of this mechanism in the direction of its drive (Law of Drive) to the new stimulus at the time thus changed its response in the sense that the mechanisms functioned along a different line.

The throwing mechanism thus underwent two fundamental changes in its functioning as a result of response along the line of its drive in this instance. First, it was in readiness to respond along a different line. Change of readiness was along the line of the new stimulus in the situation. This was change in drive. Second, it responded along different lines. Change of response was along the line of the new stimulus in the situation. This was change in response. The two changes are thus interdependent and are inseparable.

They are part and parcel of the same thing, namely, change in stimulus-response mechanisms, functioning in purposive behavior.

3. **Primary and Concomitant Changes in Conduct.** Kilpatrick analyzes[1] changes in stimulus-response mechanisms in terms of primary and concomitant outcomes. "*Primary outcomes* refer to all the learning that belongs closely to the thing immediately under consideration. If I am making a dress, then the primary includes all the learnings that comes from the actual making, such as increased skill in planning and cutting. . . . The concomitant learnings grow (in part) out of the dressmaking, but do not belong so closely or exclusively to the dress as do the primary. I say thus, 'I see it pays to be careful.' I learned this, perhaps, in connection with making the dress, but it should remain with me as an ideal that will reach beyond dressmaking. . . . Prominent among concomitants are personal attitudes, attitudes toward the several subjects of study, attitudes toward one's self, such as self-reliance or pride or humility."

Primary outcomes in this sense include change in the action of all the specific mechanisms inherent in dressmaking. They include in the first place, changes in the mechanisms involved in choosing appropriate materials (cloth, ribbon, sewing thread, and buttons); and in discovering relevant processes (designing, measuring, cutting, sewing, and pressing). In the second place, they include change in the mechanisms involved in determining the exact amount of each kind of material, proper use of necessary tools, and efficient doing of the different processes. Concomitant outcomes, on the other hand, include all the attitudes intrinsically involved in making the dress. They include attitudes toward putting forth effort in choosing appropriate materials, tools, and processes; and attitudes toward securing the exact amount of each kind of material, proper use of each tool, and efficient doing of the different processes. The concomitants are thus in the direction of primary responses. They are characteristics of the mechanisms inherently bound up in dressmaking.

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[1] Kilpatrick, W. H. Foundations of Method, p. 102f., 1925. By permission of The Macmillan Co.

This interpretation of change in stimulus-response mechanisms in terms of primary and concomitant outcomes is synonymous in certain respects with change in the drive and response of a stimulus-response mechanism. Primary outcomes include change in all stimulus-response mechanisms relevant in the consummation of a particular enterprise. Change in response, on the other hand, connotes improved action of such mechanisms. Concomitant outcomes are attitudes disposing the child toward consummation of a particular enterprise. Change in drive, on the other hand, indicates improved readiness of the child's mechanisms to respond in the direction of certain stimuli. Primary and concomitant outcomes are, in this sense, terms describing change in drive and response ensuing from the action of stimulus-response mechanisms. The former directs attention to change in the response of stimulus-response mechanisms; the latter to the change in the drive of stimulus-response mechanisms. In this sense these terms suggest the dynamic nature of human behavior. They are, for this reason, helpful in distinguishing changes in human behavior.

One further point perhaps should be emphasized in this connection. In some instances primary outcomes seem to be interpreted as change in one set of independent stimulus-response mechanisms and concomitant outcomes as change in another set. The interpretation seems to further convey the idea that each of these sets is built independently of the other. If such is the interpretation of this terminology, it misses the interpretation set forth in this discussion, for it is very obvious that each and every stimulus-response mechanism possesses in some degree the idea implied in each of these terms. In fact every stimulus-response mechanism has its own particular concomitant in the sense it possesses a readiness to respond or not to respond to particular stimuli. The sum total of all these particular mechanism-concomitants is what constitutes the general drive or "set" of life if one wishes to distinguish such a term. "Set," "attitude," or "disposition" is the term given quite frequently to the drive of an aggregate of stimulus-response mechanisms to respond in the direction of particular stimuli. The same is equally true in the case of primary outcomes. Each and every stimulus-response mechanism in fact is primary in the sense it possesses a particular response to particular stimuli. It possesses, in other words, a connection between particular stimuli (button, needle, thimble, thread, and dress) and a particular response (sewing on the button). Because of this connection it is possible for the mechanism to respond with a high degree of precision to the stimuli. This connection in action is the primary response and is a characteristic of all mechanisms. The sum total of all these connections makes up one's proficiency in consummating particular enterprises. "Habit," "skill," "knowledge" are the terms usually thought of in this connection. The point to be observed in this connection is that primary and concomitant responses are characteristics of each and every stimulus-response mechanism, and changes in these constitute changes in the functioning of stimulus-response mechanisms in purposeful behavior.

4. Growth in Terms of Change in the Drive and Response of Purposive Behavior. Many stimulus-response mechanisms function in purposive behavior and many changes result for, as we have seen (Chapters VIII and X), purposive behavior includes intrinsic operation of the laws underlying the conditioning of mechanisms. First, purposive behavior includes readiness in mechanisms to act along the line of new stimuli. It provides, in this sense, for the operation of the Law of Drive. Second, purposive behavior includes response of mechanisms along the lines of new stimuli. it provides, in this sense, operation of the Law of Response. The stimulus-response mechanisms functioning in purposive behavior are conditioned at the time as a result of response (Law of Response) along the line of the drive (Law of Drive) in the direction of new stimuli. And this conditioning of mechanisms includes, as we have just seen, change in the drive and response of mechanisms along the line of new stimuli. Growth, learning, is, in this sense, change in the drive and response mechanisms functioning in purposive behavior. It is plural. First, growth includes in every instance change in the readiness of mechanisms to function along the line of new stimuli in purposive behavior. That is it includes change in drive. Second, growth includes in every instance, change in the response of mechanisms along the line of new stimuli in purposive behavior. It includes change in response. Growth, in fine, is change in the drive and response of purposive behavior.

5. Lines of Growth in Purposive Behavior. Stimulus-response mechanisms normally function, as pointed out in Chapter XII, along particular lines of purposive behavior.

These lines are initiation of goal, evaluation of goal, choice of goal, initiation of means, evaluation of means, choice of means, execution of means, initiation of improvement, evaluation of improvement, choice of improvement, and consummation of improvement. Each line includes the functioning of a particular group of stimulus-response mechanisms and, as such, involves the response of these mechanisms along their drive in each of the several lines. There are, in this sense, eleven possible lines of growth. The first line includes change in drive and response in the initiation of goals. This includes conditioning of mechanisms along the line of new stimuli in the initiation of goals in purposive behavior. It is indicated by the progress of pupils in the initiation of goals to pursue. The second line includes change in drive and response in the evaluation of goals in purposive behavior. This includes conditioning of mechanisms along the line of new stimuli in the evaluation of goals in purposive behavior. It is indicated by the progress of pupils in the evaluation of goals. The third line includes change in drive and response in the choice of goals. This includes conditioning of the mechanisms along the line of new stimuli in choice of goals in purposive behavior. It is indicated by the progress of pupils in the choice of goals. The fourth line includes change in drive and response in the initiation of means. This includes conditioning of mechanisms along the line of new stimuli in the initiation of means in purposive behavior. It is indicated by the progress of pupils in the initiation of means. The fifth line includes change in drive and response in the evaluation of means. This includes conditioning of mechanisms along the line of new stimuli in the evaluation of means in purposive behavior. It is indicated by the progress of pupils in the evaluation of means. The sixth line includes change in drive and response in the choice of means. This includes conditioning of mechanisms along the line of new stimuli in the choice of means in purposive behavior. It is indicated by the progress of pupils in the choice of means. The seventh line includes change in drive and response in the execution of means. This includes conditioning of mechanisms along the line of new stimuli in the execution of means in purposive behavior. It is indicated by the progress of pupils in the execution of means. The eighth line includes change in drive and response in the initiation of improvements. This includes conditioning of mechanisms along the line of new stimuli in the initiation of improvements in purposive behavior. It is indicated by the progress of pupils in the initiation of improvements. The ninth line includes change in drive and response in the evaluation of improvements. This includes conditioning of mechanisms along the line of new stimuli in the evaluation of improvements in purposive behavior. It is indicated by the progress of pupils in evaluation of improvements. The tenth line includes change in drive and response in the choice of improvements. This includes conditioning of mechanisms along the line of new stimuli in the choice of improvements in purposive behavior. It is indicated by the progress of pupils in choice of improvement. The eleventh, and last line, includes change in drive and response in the consummation of improvements. This includes conditioning of mechanisms along the line of new stimuli in the consummation of improvements in purposive behavior. It is indicated by the progress of pupils in performing the improvements selected. Growth, learning, education, in fine, are continuous change in the drive and response of individuals in initiation of goals, evaluation of goals, choice of goals, initiation of means, evaluation of means, choice of means, execution of means, initiation of improvements, evaluation of improvements, choice of improvements, and consummation of improvements. These are the lines of growth in purposive behavior.

6. **Conduct Growth versus Fact Growth.** This interpretation of growth contrasts quite sharply with the traditional interpretation in at least two major particulars. The first contrast is in the nature of growth. Growth traditionally is interpreted as the assimilation of facts isolated from the conduct of boys and girls. It is, in this sense, the accumulation of facts, such as historical facts, geographical facts, grammatical facts, etc. Growth set forth in the present discussion is interpreted as change in children's drives and responses in the initiation, evaluation, and choice of goal; initiation, evaluation, and choice of means; execution of means; initiation, evaluation, choice, and consummation of improvement. It is change in children's conduct. One is fact growth; the other is conduct growth. The second contrast is in the lines of growth. The traditional interpretation includes the conventional school subject as the lines of growth. Growth according to this interpretation is accumulation of facts in history, geography, arithmetic, grammar, and the like. The lines of conduct growth are quite different. They include change in children's conduct in the initiation, evaluation, and choice of goals; initiation, evaluation, and choice of means; execution of means; and initiation, evaluation, choice, and consummation of improvement. In one case the lines of growth are the conventional school subjects; in the other the lines of growth are the purposeful activities of boys and girls.

CHAPTER XXI

MEASUREMENT OF CHANGES IN PURPOSIVE BEHAVIOR: AN ACTIVITY SCALE

1. Nature of Scale. Purposive behavior involves, as we have seen, response of children along their drive in the initiation, evaluation, and choice of goal; initiation, evaluation, and choice of means; execution of means; and initiation, evaluation, choice, and consummation of improvement. To measure changes in purposive behavior thus demands successive measurement of the child's response along its drive in these traits. Such measurement should be quantitative for quantitative measurement is the most reliable method of measurement. It should express changes in drives and responses of purposive behavior in quantitative terms. Any proposed scale for measuring purposive behavior should satisfy these conditions. First, it should measure changes in drives and responses of purposive behavior. It should be a behavior scale. Second, it should express changes in drives and responses of purposive behavior in quantitative terms. It should be a quantitative scale.

2. Scale Criteria. In common with measurements for any purpose, a behavior scale should satisfy certain fundamental criteria. It should be constructed with these criteria in mind. These fundamental criteria are validity, reliability, objectivity, and usability. Validity demands that a scale measure what it purports to measure. If a behavior scale purports to measure changes in drives and responses of purposive behavior it is valid if it measures such drives and responses. A behavior scale thus would not be a valid measure for historical facts, as such, for it does not purport to measure such facts. Reliability demands that a scale measures consistently what it purports to measure. A behavior scale thus would be reliable if it measured consistently changes in drives and responses of purposive behavior in varied enterprises. Objectivity demands that a scale measure observable things. A behavior scale is objective if the changes in drives and responses it purports to measure are observable by competent teachers. Usability demands that a scale be practicable. A behavior scale is practicable if it can be administered in schoolrooms by competent teachers in determining changes in children's responses along their drive in the traits of purposive behavior.

3. **Scale Elements.** Any proposed behavior scale should encompass all the traits of purposive behavior for successful conduct of boys and girls includes all of these traits. These traits are, as previously indicated in Chapter XII, initiation of goal, evaluation of goal, choice of goal; initiation of means, evaluation of means, choice of means, execution of means; initiation of improvement, evaluation of improvement, choice of improvement, and consummation of improvement. The scale organization should be in accordance with the order in which these traits function in purposive behavior. This order is indicated in the following statement of traits.

BEHAVIOR SCALE ELEMENTS

1. Initiation of Goal.
2. Evaluation of Goal.
3. Choice of Goal.

4. Initiation of Means.
5. Evaluation of Means.
6. Choice of Means.
7. Execution of Means.
8. Initiation of Improvement.
9. Evaluation of Improvement.
10. Choice of Improvement.
11. Consummation of Improvement.

4. **Scale Units.** A behavior scale involves two elemental units: (1) drive and (2) response. It involves these units for two basic reasons. In the first place, drive and response make up the two phases of purposive behavior. Any instance of purposive behavior, for example Roly Poly, involves many stimulus-response mechanisms in action. Each stimulus-response mechanism involves a drive toward action in the sense that it is in readiness to function in the direction of certain stimuli, and it also involves a response in the sense that it functions in the direction of its drive. Drive and response are in this sense the elemental units making up the traits of purposive behavior. To measure changes in purposive behavior thus demands successive measurement of the child's drives and responses along initiation of goal, evaluation of goal, and choice of goal; initiation of means, evaluation of means, and choice of means; execution of means; initiation of improvement, evaluation of improvement, and choice of improvement; consummation of improvement. In the second place drive and response function simultaneously in the traits of purposive behavior. A stimulus-response mechanism in action involves, as we have seen, two fundamental factors. It involves, in the first place, a drive in the direction of certain stimuli; it involves readiness to function in a particular direction. In the

second place, it involves a response in the direction of its drive. It involves, in other words, response along its drive. A functioning stimulus-response mechanism, in this sense, involves simultaneous action of its drive and response along the traits of purposive behavior. This necessitates successive measurement of both elemental units of the traits of purposive behavior at the same time, and demands, furthermore, that any proposed behavior scale include both of these units in its construction.

There is yet another fundamental relationship. Drive is, as we have seen, readiness of stimulus-response mechanisms included in a particular trait to function, while response is overt action of these mechanisms. Drive thus precedes response, for without readiness in stimulus-response mechanisms to respond overt response could not occur. The following perhaps indicates this relationship:

$$\left.\begin{array}{l}\text{Drive}\\ \text{Response}\end{array}\right\}\text{Initiation of Goal}$$

5. Illustrations of Scale Units. Following is a statement of each trait of purposive behavior together with its illustration and tests for recognition:

Behavior Trait 1—INITIATION OF GOAL

I. Explanation:

Initiation of Goal includes children suggesting the goal they wish to pursue whether it be in individual or group activity.

II. Illustration:

"Pshaw, I'm so tired," remarked James (near the close of the story conference). "We've been telling stories so long."

"Let's play Roly Poly," suggested John. "I'm tired too. My feet have gone to sleep."

"Gosh, John, that's what I want to play too," interrupted Lonnie. "I bet I can win."

"Shame, Lonnie, don't you know what mamma said she'd do if you didn't quit saying that word," scolded Jennie. "I'd like to play volley ball."

"Say kids, I'll tell you what let's do," exclaimed Mary. "Let's dramatize the Gingerbread Boy story. I just hate old Roly Poly."

"Shucks, Mary, all you can think about is old stories," retorted Bill. "I'd like to play a game of town ball."

III. Tests:

Does each child exhibit any one of the following?

1. *For drive in initiation of goal.*
   (a) voluntary proffering a particular goal.
   (b) outside compulsion in proffering a particular goal.

2. *For response in initiation of goal.*
   (a) overt proffering a particular goal.
   (b) non-proffering a particular goal.

Behavior Trait 2—EVALUATION OF GOAL

I. Explanation:

Evaluation of Goal includes children discussing (before making a choice) (1) the particular things to do in execution of the suggested goals and (2) the possibility of doing these things. With group activity the group as a whole evaluates the suggested goals. With individual activity, the individual child evaluates the suggested goals with the assistance of the teacher. Evaluation of a goal may occur at the time a goal is suggested, or it may occur after all goals have been suggested.

II. Illustration:

"Billy Johnson, don't you know we'll have to play town ball outdoors?" explained Iona. "We can't play today."

"Why?" exclaimed Billy. "All we'd have to do is to get the bat, ball, and glove."

"It's raining, don't you see?" continued Iona. "We can't play in the rain."

"Shucks, you're just afraid you'll get that new dress wet, I guess," retorted James.

"I know! I know!" exclaimed Carl. "Let's play inside."

"Well! Well! This room isn't big enough," broke in Christine. "We'd have to go outdoors."

"Oh, me," sighed Carl. "I guess you're right."

"We can't play volley ball either," explained Kenneth. "That's hard luck."

"Well, why?" queried Jennie. "All we'd have to do is to put up our net and decide on our score."

"We'd have to play outdoors though," continued Kenneth. "Don't you see it's raining?"

"Gee, we can play Roly Poly," argued John. "We can play right in this room."

"Sure," agreed Bobby. "All we'll have to do is to make out triangle and bowling lines."

"That's not all," disagreed Jimmie. "We have to decide on our rules and make our score board."

"You're right, Jimmie," interrupted Lonnie. "But that's easy."

"I know what we can do," broke in Mary. "We can dramatize the Gingerbread Boy right where we are."

"That's right," agreed Jennie. "But it would take too long to get ready."

"Wouldn't take any longer than Roly Poly," argued Mary. "All we have to do is to select our characters and act out our parts."

"But all of us can't take part," explained Carl. "We can in Roly Poly."

"Can too," retorted Mary. "There's a part for everyone. You just don't want a part. I won't take a part in your old Roly Poly either."

"Shucks, Mary, you don't know what you are talking about," interrupted James. "You'll play if the rest of us do, won't she Miss Burke?"

"Surely," remarked Miss Burke. "Whatever the most of us agree on is what we'll do, isn't it?"

"Well, I guess so," grumbled Mary. "I just hate old Roly Poly, though I want to dramatize my story."

"Oh! Ho!" laughed John. "I thought so" (referring to Mary's story). "I'm just dying to play Roly Poly."

III. Tests:

Does each child exhibit any one of the following:

1. *For drive in evaluation of goal.*
    (a) voluntary discussion of things to do in pursuit of a particular goal.
    (b) voluntary discussion of possibility of doing things involved in a particular goal.
    (c) outside compulsion in either (a) or (b).
2. *For response in evaluation of goal.*
    (a) overt discussion of things to do in pursuit of a particular goal.
    (b) overt discussion of possibility of doing things involved in a particular goal.
    (c) non-discussion in either (a) or (b).

Behavior Trait 3—CHOICE OF GOAL

I. Explanation:

Choice of Goal includes children indicating a preference for some one of the suggested goals. With group activity, the chosen goal may be the choice of the group as a whole or the group may divide into smaller groups each choosing its own goal. With individual activity, the individual child makes the choice with the assistance of the teacher.

II. Illustration:

"Let's vote," suggested Lucille. "We've discussed everything suggested."

"I'm ready to choose one," added Jennie.

"Me too," shouted Neva. "You know the one getting the most votes is the one we'll do."

"Sure," interrupted Iona. "Oh! I can hardly wait!"

"Roly Poly is my choice," exclaimed Carl.

"It's mine too," put in John. "That's two votes—see!"

"I'm for dramatizing the Gingerbread Boy story," shouted Mary. "That is one vote."

"Put me down for Roly Poly," insisted Lonnie. "That's three votes."

"Yes and me," added Billie. "It's going to be unanimous."

"It's not, smarty," remonstrated Mary. "I never voted for Roly Poly,—see?"

"And Kenneth didn't vote for anything," added Jennie. "Roly Poly got the most votes though."

III. Tests:

Does each child exhibit any one of the following?

1. *For drive in choice of goal.*
   (a) voluntary approval of a particular goal.
   (b) outside compulsion in approval of a particular goal.
2. *For response in choice of goal.*
   (a) overt approval of a particular goal.
   (b) non-approval of a particular goal.

Behavior Trait 4—INITIATION OF MEANS

I. Explanation:

Initiation of Means includes children suggesting the particular processes necessary in attaining their goal. With group activity, it may be that the group as a whole initiates the means, or it may be that the group divides into smaller groups each initiating means for a particular division of the plan. With individual activity, the individual child initiates all the means.

II. Illustration:

"I'd like to make the sides of our triangle four feet long," suggested James. "You know we have to place the Roly Polys on the lines of the triangle and we want to have plenty of room."

"Let's have three bowling lines," interrupted John. "One could be five feet from the triangle, another ten, and another fifteen."

"I want to know how we're going to keep up with our scores," queried Billie. "Let's make a score board like we use in town ball."

"That's just what I was going to say," added Carl. "Let me make it."

III. Tests:

Does each child exhibit any one of the following?

1. *For drive in initiation of means.*
    (a) voluntary proffering a particular means.
    (b) outside compulsion in proffering a particular means.
2. *For response in initiation of means.*
    (a) overt proffering a particular means.
    (b) non-proffering a particular means.

Behavior Trait 5—EVALUATION OF MEANS

I. Explanation:

Evaluation of Means includes children discussing (1) how to perform a particular process, and (2) possibility of performing the process before making a choice. With group activity, it may be the group as a whole evaluates the suggested processes, or it may be the group divides into smaller groups each evaluating a particular part of the suggested processes. With individual activity, the individual child evaluates all of the suggested processes with the assistance of the teacher. Evaluation of suggested processes may take place at the time each process is suggested, or it may take place after all the processes have been suggested.

II. Illustration:

"Well, I can't see," interrupted Iona, "why we need more than one bowling line. Why can't we all stand on the first one?"

"You don't," interjected John. "But it's more fun to have two or three. Anyway I read in one game book where there can be more than one bowling line and the score you make is always counted by the line you play."

"Yes," agreed Kenneth. "And another thing it said was the score value of the line nearest the triangle is least and the one farthest is greatest."

"Oh! Gee!" broke in Lonnie. "I'll take the chance on the farthest line. I'm better on long throws."

"I won't," objected Neva. "I'd rather be close."

"Girls are little 'fraidy cats' anyway," teased Lonnie. "It's easy from the farthest line."

"Boys think they are so smart," pouted Neva. "Anyway, if I stand on the closest line, I'll not miss so many Roly Polys, I guess."

"Listen here," admonished Carl. "You can stand on any line you wish and you can change any time you wish."

"I don't believe that," argued Lonnie. "Your score is counted from the bowling line you play on."

"I know that," explained Carl. "But you can change any time you wish and the score counts from the line you bowl from."

"How's that done?" queried Billie. "I'd like to know."

"Well," continued Carl, "if you select the first line and bowl a Roly Poly over with your first ball, you'd make one; if you then changed to the second line and hit a Roly Poly with your second ball, you'd make two, see?"

"Yes," replied Billie.

"And if you then changed to the third line and hit another Roly Poly with your third ball, you'd make three," continued Carl. "If you want to, you can throw all three balls from any one of the lines, though."

"I see, now," remarked Lonnie. "I know how, now."

III. Tests:

Does each child exhibit any one of the following?

1. *For drive in evaluation of means.*
    - (a) voluntary discussion of how to perform a particular means.
    - (b) voluntary discussion of possibility of performing a particular means.
    - (c) outside compulsion in discussion of either (a) or (b).
2. *For response in evaluation of means.*
    - (a) overt discussion of how to perform a particular means.
    - (b) overt discussion of possibility of performing a particular means.
    - (c) non-discussion of either (a) or (b).

Behavior Trait 6—CHOICE OF MEANS

I. Explanation:

Choice of Means includes children's approval or disapproval for use in execution of suggested processes. Choice may be made at the time a suggested process is evaluated, or it may be made after all suggested processes have been evaluated. With group activity, the group as a whole makes the choice. With individual activity, the individual child makes the choice with assistance of the teacher. Preference for or against a particular process is usually (in case of group activity) by voting. Either approval or disapproval counts in choice of means.

II. Illustration:

"Well, we haven't decided about the size of the triangle yet," explained John. "I want to make each side four feet long. How about it?"

"You said you had to put the Roly Polys on the triangle, didn't you?" queried Neva (who found it hard to remember everything).

"Yes, I told you that," replied John sharply. "You have to put one on each corner and two on each side. You have to be sure and have them the same distance apart."

"I think the sides of the triangle are too long," objected Iona. "It would be hard to hit a Roly Poly when they are so wide apart."

"Aw, Iona! You don't know. You never did play this game," exclaimed Lonnie (with an important air). "That's just the right size. If it was any smaller, you'd miss the whole triangle."

"How many of you think like Lonnie and some of the rest of us?" queried John. "Let's vote."

"I'm for four feet," exclaimed Lonnie.

"Me too," added John.

"I'm not," retorted Iona. "What do you say, Mary?"

"I don't care," replied Mary. "I'm not voting."

This illustrates choice of means on the part of Lonnie, John, and Iona (test 1 applying in first two instances and test 2 in last instance), and non-choice on part of Mary (test 2 (a) applying).

III. Tests:

Does each child exhibit any one of the following?

1. *For drive in choice of means.*
   (a) voluntary approval or disapproval of a particular means.
   (b) outside compulsion in approval or disapproval of a particular means.
2. *For response in choice of means.*
   (a) overt approval or disapproval of a particular means.
   (b) non-approval of a particular means.

Behavior Trait 7—EXECUTION OF MEANS

I. Explanation:

Execution of Means includes children's performance of the processes chosen for attaining their goal. With group activity, it may be that the group as a whole performs the processes, or it may be that the group divides into smaller groups, each performing a part of the processes. With individual activity, the individual child performs all the processes, with the assistance of the teacher.

II. Illustration:

"Oh, look," exclaimed Lonnie excitedly. "I brought down two Roly Polys out of three bowls."

"My time next," interrupted Neva.

"Five!" yelled Lonnie as he ran to the score board.

"Gee, I hit three," said Neva. "Oh, me! I wish I had been on the second line. It would have counted so much more."

"What's your score?" retorted John.

"Three!" yelled Neva, running to the score board.

III. Tests:

Does each child exhibit any one of the following?

1. *For drive in execution of means.*
   (a) voluntary performance of a particular means.
   (b) outside compulsion in performance of a particular means.
2. *For response in execution of means.*
   (a) overt performance of a particular means.
   (b) non-performance of a particular means.

Behavior Trait 8—INITIATION OF IMPROVEMENT

I. Explanation:

Initiation of Improvement includes children suggesting changes in the pursuit of their goal. It includes changes (1) in choice of means, e.g., elimination, substitution, addition, or modification of processes; (2) in organization of means, e.g., modification of the order in performing processes; and (3) in execution of means, e.g., performance of neglected means. With group activity, the group as a whole initiates the improvement. With individual activity, the individual child initiates the improvements with the assistance of that teacher. The improvements may be initiated at the time a particular means is executed or they may be initiated after all means have been executed.

II. Illustration:

"I think I'll know better how to throw my balls next time," suggested Carl. "A lot depends on that."

"Some of the girls didn't stand with their toes on the line," criticized Kenneth. "I saw Neva with her whole foot over the line."

"I think I'll try the third line next time," remarked Jimmie. "It takes so long to make a good score on the first line."

III. Tests:

Does each child exhibit any one of the following?

1. *For drive in initiation of improvement.*
   (a) voluntary proffering a particular improvement.
   (b) outside compulsion in proffering a particular improvement.
2. *For response in initiation of improvement.*
   (a) overt proffering a particular improvement.
   (b) non-proffering a particular improvement.

Behavior Trait 9—EVALUATION OF IMPROVEMENT

I. Explanation:

Evaluation of Improvement includes children discussing the desirability and practicability of suggested improvements. It involves discussion of (1) how to perform the improvements and (2) possibility of performing the improvements before making a choice. With group activity, the group as a whole evaluates the suggested improvements. With individual activity, the individual child evaluates the improvements with assistance of the teacher. Evaluation of suggested improvements may occur at the time the improvements are suggested, or it may occur after all improvements have been suggested.

II. Illustration:

"I think I'll try the third line next time," argued Jennie. "It takes so long to make a good score on the first line, no matter how lucky you are."

"Yes, and you won't make anything," objected Fred. "I can bring down a Roly Poly every time on the first line."

"I can too," retorted Jennie. "But it doesn't count much."

"Shucks, it counts more than missing all the bowls," argued Fred. "You'd never hit a Roly Poly from that back line."

"You just think so," broke in Jennie. "If I hit only one I'd make as much as you'd do with three bowls on the first line, see?"

III. Tests:

Does each child exhibit any one of the following?

1. *For drive in evaluation of improvement.*
   - (a) voluntary discussion of how to perform a particular improvement.
   - (b) voluntary discussion of possibility of performing a particular improvement.
   - (c) outside compulsion in either (a) or (b).
2. *For response in evaluation of improvement.*
   - (a) overt discussion of how to perform a particular improvement.
   - (b) overt discussion of possibility of performing a particular improvement.
   - (c) non-participation in either (a) or (b).

Behavior Trait 10—CHOICE OF IMPROVEMENT

I. Explanation:

Choice of Improvement includes children's selecting improvements to effect. Choice may be made at the time a particular improvement is evaluated, or it may be made after all improvements have been evaluated. With group activity, the group as a whole selects the improvements. With individual activity, the individual child selects the improvements with the assistance of the teacher. Choice of improvement is usually indicated (in case of group activity) by voting. Either approval or disapproval of particular improvements counts as participation in choice of improvement.

II. Illustration:

"You would have done better, Carl, if you had rolled your balls from the bowling lines," suggested John. "You ought to practise rolling your balls."

"That's right," interrupted Christine. "I had the same trouble—seems I just had to pitch them."

"I'm sure going to practise rolling my balls," remarked Carl. "I can't make a good score pitching my balls at the Roly Polys."

"Me too," agreed Christine. "It's all in knowing how to roll your ball."

III. Tests:

Does each child exhibit any one of the following?

1. *For drive in choice of improvement.*
   (a) voluntary approval or disapproval of a particular improvement.
   (b) outside compulsion in approval of a particular improvement.

2 *For response in choice of improvement.*
   (a) overt approval or disapproval of a particular improvement.
   (b) non-approval of a particular improvement.

Behavior Trait 11—CONSUMMATION OF IMPROVEMENT

I. Explanation:

Consummation of Improvement includes children performing the improvement chosen to effect. It may occur at the time an improvement is chosen or it may occur after all improvements have been chosen. With group activity, the group as a whole may perform the improvements, or it may divide into smaller groups, each performing a particular part of the improvements. With individual activity, the individual child performs the improvements with assistance of the teacher.

II. Illustration:

"Miss Burke, may I practise rolling my balls at the Roly Polys?" queried Carl. "I just can't roll them."

"When?" asked Miss Burke. "You know it's time to go home, don't you?"

"Yes," replied Carl quickly. "But I want to practise rolling my balls anyway. Mamma won't care."

"All right," agreed Miss Burke. "Put the Roly Polys away when you are through."

"Gee, Miss Burke, just see my balls roll," exclaimed Carl (on rolling his balls toward the Roly Polys). "I'll put the Roly Polys away, Miss Burke."

III. Tests:

Does each child exhibit any one of the following?

1. *For drive in consummation of improvement.*
    - (a) voluntary performance of a particular improvement.
    - (b) outside compulsion in performance of a particular improvement.
2. *For response in consummation of improvement.*
    - (a) overt performance of a particular improvement.
    - (b) non-performance of a particular improvement.

6. Scale Value. Quantitative measurement of purposive behavior demands that the scale units—drive and response—have a definite numerical value. "One" seems to be the most desirable unit value for it lends itself to easy computation and quantitative thinking. Any other numerical value, for example, "ten," might be assigned to the scale units. The disadvantage of such a value, however, is its added difficulty in computation of scale scores and in quantitative thinking in terms of scale values. Each drive, in this sense, has a numerical value of "One." Likewise each response has the same numerical value, for drive and response are of equal value in the functioning of stimulus-response mechanisms in purposive behavior.

7. Scale Scoring. Scale scoring involves counting the particular drives and responses functioning in the purposive behavior of boys and girls. It involves in this sense three conditions. In the first place, scoring drives and responses should take place at the time they function in the conduct of boys and girls for in no other way is it possible to measure them objectively. Response in initiation of goal, for example, should be counted at the time it functions in the conduct of boys and girls. In the second place, scoring should indicate the number of drives and responses functioning in the several traits of purposive behavior. Drive in initiation of goal, for example, should be recorded under the behavior trait, initiation of goal; response in initiation of means under the behavior trait, initiation of means, etc. In the third place, scoring should indicate the particular drives and responses functioning in the behavior of each individual pupil participating in an enterprise. This necessitates counting the drives and responses of each individual boy and girl. Scale scoring in this sense involves counting each drive and response functioning in the conduct of each individual boy and girl. The tally mark probably is the most practical device for recording particular drives and responses along the traits of purposive behavior.

8. Scale Indexes. The scale scores reveal the status of each pupil's drives and responses functioning in purposive behavior. They reveal, in the first place, the number of drives functioning in the case of each individual boy and girl. They indicate, in other words, the number of voluntary responses and involuntary responses. The scale score in this sense reveals the ratio between the voluntary and involuntary responses for each individual boy and girl for each of the several traits of purposive behavior. This ratio might be expressed as the Drive Index. It expresses in a single term the ratio between each pupil's voluntary and involuntary responses functioning in purposive behavior. It expresses quantitatively the status of each child's drive functioning in purposive behavior.

In the second place the scale scores reveal the status of each child's response functioning in purposive behavior. They reveal the number of responses made by each child as well as the total number of responses made in the consummation of an enterprise. They indicate, in this sense, the ratio between each child's responses and the total number of responses made in carrying forward purposive behavior. This ratio might be expressed as the Response Index. It expresses in a single term the status of each child's response to the total responses in carrying forward an enterprise.

9. The Drive Index Formula. The Drive Index, as we have seen, is a quantitative term expressing the status of each child's drives in pursuing purposive behavior. It is obtained by dividing the total number of a child's drives (voluntary responses) in a trait by the total number of its responses made in carrying forward the trait successfully. The formula is:

$$\text{Drive Index equals } \frac{\text{CD}}{\text{CR}} \times 100.$$

(CD is symbol for child drive; CR is symbol for child response.)

The formula is the same for both individual and group activity. A Drive Index of 100 in either instance is ideal. It indicates all the child's responses functioning in a trait of an enterprise are voluntary. The following illustrates the method for computing the Drive Index. Suppose Willie's score shows a total of 300 drives and 300 responses in the execution of trait of, say, a sailboat. His Drive Index equals 300 divided by 300 multiplied by 100 giving 100. Willie's Drive Index indicates that all of his responses are voluntary in this instance. It is ideal. It indicates Willie is in a state of readiness to make a sailboat.

10. The Response Index Formula. The Response Index, as we have seen, is a quantitative term expressing the status of each child's response functioning in purposive behavior. The formula differs for individual and group behavior.

I. THE RESPONSE INDEX FORMULA FOR INDIVIDUAL BEHAVIOR

The Response Index for individual behavior is obtained by dividing the responses actually made by a child in a trait by the total number of responses made in carrying forward the trait successfully. The formula is:

$$\text{Response Index equals } \frac{\text{CR}}{\text{CR} + \text{TR}} \times 100.$$

(CR is symbol for child response; TR is symbol for teacher response.)

A Response Index of 100 is ideal. It indicates the child made all the responses in carrying forward a trait of purposive behavior. The following illustrates the method for computing the Response Index for individual behavior: Suppose Willie's score shows he made 300 responses in the execution trait of, say, making a sailboat and that there were 300 responses involved in the successful performance of this trait. His Response Index is equal to 300 divided by 300 multiplied by 100 giving 100. Willie's Response Index thus indicates that he made all of the responses in the execution trait in making the sailboat. It is ideal.

II. THE RESPONSE INDEX FORMULA FOR GROUP BEHAVIOR

The Response Index for group behavior is obtained by dividing the responses actually made by a child in a trait by the mean group response made by all pupils participating in the trait. The formula is:

$$\text{Response Index equals } \frac{CR}{MR} \times 100.$$

(CR is symbol for child response; MR is symbol for the mean group response.)

A Response Index of 100 is ideal for a group of boys and girls of similar ability. It indicates that each child participating in a trait of group behavior made his share of the responses needed in its successful consummation. The following illustrates the method for computing the Response Index for group behavior. Suppose John made 100 responses in the execution trait of group behavior, say, How Our Ice Is Made, Mary 50, Carl 150, Bill 100, and Tom 100. The mean group response is 100. The Response Index for each child in this trait is as follows:

John's R. I. equals $\frac{100}{100} \times 100$ or 100

Mary's R. I. equals $\frac{50}{100} \times 100$ or 50

Carl's R. I. equals $\frac{150}{100} \times 100$ or 150

Bill's R. I. equals $\frac{100}{100} \times 100$ or 100

Tom's R. I. equals $\frac{100}{100} \times 100$ or 100

John's, Bill's, and Tom's Response Index are ideal. Each made his share of the responses in this trait. Mary's Response Index is 50 below the ideal. She made only one-half of her share of the responses. Carl's Response Index is 50 above the ideal. He made one-half more than his share of the responses in the trait.

11. **Expressing Scale Results.** There are three methods for expressing changes in the purposive behavior of boys and girls: tabular, linguistic, and chart. The tabular method involves presentation of changes in the Drive and Response Indexes in number tables in such fashion as to indicate the extent of change ensuing in successive measurements. The linguistic method involves presentation of changes in the Drive and Response Indexes in language form. It is a word description of the extent of changes in children's drives and responses revealed by successive measurement. The chart method involves a pictorial presentation of changes in the Drive and Response Indexes in such manner as to indicate the extent of changes in purposive behavior resulting from successive measurements.

The chart method is probably the most efficient way to express the extent of changes in purposive behavior resulting from successive measurements, for at least two reasons. First, the chart is more easily interpreted than a table of figures or description. It does not require as much technical skill in its interpretation as does the tabular or linguistic method and is, for this reason, more easily interpreted. Second, the chart is more quickly interpreted than either tables or language. It does not demand analysis of data in its interpretation as does the tabular or linguistic method. It is for these reasons that the chart method seems the most effective method for expressing the changes in purposive behavior revealed by successive measurements.

This method should express the two units of purposive behavior. First, it should express the extent of pupil drives prevailing in particular enterprises. It should express the extent of pupil drives functioning along the traits of purposive behavior. Second, it should express the extent of pupil responses prevailing in particular enterprises. It should express the extent of pupil responses functioning along the traits of purposive behavior. The curve graph is perhaps the most effective diagram for expressing these results. It admits, first, of charting both the Drive and Response Indexes of individual children on a single chart. This is desirable for it demands only one form for expressing changes in the Drive or Response Indexes of individual pupils resulting from successive measurements. Second, it admits of an unbroken diagram of the Drive and Response Indexes of individual boys and girls. This is a distinct advantage, for it expresses at a glance the extent of changes in the Drive and Response Indexes of successive measurements of the traits of purposive behavior. Third, its construction demands minimum time and effort. This is a very decided advantage for many teachers do not have the time, training, and equipment necessary for the construction of the more complicated charts.

12. **Scale Form.** Any form adopted should meet certain fundamental conditions. First, it should represent individual children. It should reveal changes in the drives and responses of each individual pupil along each of the several traits of purposive behavior. Second, it should express changes in quantitative terms. It should indicate changes in drives and responses along each of the traits of purposive behavior in quantitative terms. Third, it should be practical. It should involve minimum effort in scoring the drives and responses along any particular trait of purposive behavior. Fourth, it should be applicable to both individual and group behavior. It should admit of use in measuring the drives and responses of boys and girls along the traits of purposive behavior in either individual or group enterprise.

The following three-part form is suggested.[1] The first part makes provisions for scoring individual pupils along each trait of purposive behavior. Space is provided for recording drives and responses of the pupil along each of the traits of purposive behavior. This part may be designated as the Activity Score Card (Figure 13), since it indicates the drives and responses made by individual pupils along each trait of purposive behavior. The second part includes provision for expressing the drives and responses of individual pupils along each of the traits in quantitative terms. Space is provided for recording the Drive and Response Indexes for the individual pupil along each of the traits of purposive behavior. This part may be designated as the Activity Index Card (Figure 14), since it indicates the amount of each pupil's drive and response along the traits of purposive

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[1] Collings, E. Conduct Scale for the Measurement of Teaching, 1927, Edwards Brothers.

Activity____________________ **Grade**________________

Teacher____________________ **Date**________________

	ACTIVITY TRAITS											
Pupils	Drive and Response Index	**Initiation of Goal**	**Evaluation of Goal**	**Choice of Goal**	**Initiation of Means**	**Evaluation of Means**	**Choice of Means**	**Execution of Means**	**Initiation of Improvement**	**Evaluation of Improvement**	**Choice of Improvement**	**Consummation of Improvement**
	D											
	R											
	D											
	R											
	D											
	R											
	D											
	R											
	D											
	R											
	D											
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	R											
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	R											
	D											
	R											
	D											
	R											

FIGURE 13.—The Activity Score Card.

behavior. The third part includes provision for expressing changes in the drives and responses of individual pupils along each trait of purposive behavior. Space is provided for charting the Drive and Response Indexes of individual pupils along each of the traits of purposive behavior. This part may be designated as the Activity Chart (Figure 15),

Activity________________ Grade________________

Teacher________________ Date________________

Pupils	Drive and Response	ACTIVITY TRAITS											
		Initiation of Goal	Evaluation of Goal	Choice of Goal	Initiation of Means	Evaluation of Means	Choice of Means	Execution of Means	Initiation of Improvement	Evaluation of Improvement	Choice of Improvement	Consummation of Improvement	
	D												
	R												
	D												
	R												
	D												
	R												
	D												
	R												
	D												
	R												
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FIGURE 14.—The Activity Index Card.

since it expresses the amount of changes in the Drive and Response Indexes of individual pupils resulting from successive measurements.

1. Activity________ 2. Child________ 3. Teacher________ 4. Date________

DRIVE AND RESPONSE INDEX	ACTIVITY TRAITS											DRIVE AND RESPONSE INDEX
	Initiation of Goal	Evaluation of Goal	Choice of Goal	Initiation of Means	Evaluation of Means	Choice of Means	Execution of Means	Initiation of Improvement	Evaluation of Improvement	Choice of Improvement	Consummation of Improvement	
100												100
95												95
90												90
85												85
80												80
75												75
70												70
65												65
60												60
55												55
50												50
45												45
40												40
35												35
30												30
25												25
20												20
15												15
10												10
5												5

FIGURE 15.—The Activity Chart.

13. Lines of Measurement. The measurement of changes in purposive behavior may be along three lines. The first involves change in the child's drive and response along particular traits of purposive behavior. This line of measurement indicates change along particular traits of purposive behavior, such as, for example, initiation of goals. The second line indicates change in the child's drive and response along a selected combination of traits in purposive behavior. This line of measurement indicates change along a selected combination of traits, such as, for example, initiation of means, evaluation of means, and choice of means. The third line involves change in the child's drive and response along all the traits of purposive behavior. This line of measurement indicates change in all the traits, such as, for example, initiation, evaluation, and choice of goals; initiation, evaluation, and choice of means; execution of means; and initiation, evaluation, choice, and consummation of improvement. Measurement of changes in purposive behavior may be, in this sense, along any one of the following lines:

I Change in the child's drive and response along any particular trait of purposive behavior.
II Change in the child's drive and response along a selected combination of traits of purposive behavior.
III Change in the child's drive and response along all traits of purposive behavior.

14. Procedure of Measurement. Following are the steps usually prevailing in the measurement of changes in purposive behavior:

I *Line of Measurement.* Decide on the line of measurement, e.g., whether measurement is to reveal change along particular traits, selected combination of traits, or all traits of purposive behavior.

II *Selection of Activities.* Select the particular activities to measure, e.g., the initial activity and the final activity.

III *Preparing the Activity Score Card.* Prepare two Activity Score Cards—one for the initial activity and one for the final activity.

IV *Scoring.* Visit the classroom at the time the Initial and Final Activities are under way and score each pupil's drive and response along the traits selected to measure.

V *Preparing the Index Card.* Prepare two Activity Index Cards—one for the Initial Activity and one for the Final Activity.

VI *Computation of Indexes.* Compute the Drive and Response Indexes for each pupil along the traits selected to measure for both the Initial and Final Activities.

VII *Preparing Activity Charts.* Prepare two activity charts for each pupil—one for the Initial Activity and one for the Final Activity.

VIII *Charting Indexes.* Chart the Drive and Response Indexes of each pupil along the traits selected to measure for both the Initial and Final Activities.

IX *Computation of Changes.* Compute the difference between the Drive and Response Indexes of the Initial and Final Activities and determine whether the change is positive or negative and how much in each instance.

15. **Trustworthiness of Scale.** The trustworthiness of a behavior scale is determined by subjecting it to the scale criteria. The elements of a behavior scale are, as we have seen, initiation of goal, evaluation of goal, choice of goal, initiation of means, evaluation of means, choice of means, execution of means, initiation of improvement, evaluation of improvement, choice of improvement, and consummation of improvement. These are the traits of purposive behavior.

The trustworthiness of each trait is determined by experimental studies of the activities of boys and girls. Initiation of goal, for example, is valid if it is found in such studies to be a functioning element in the activities of children; is reliable if it is found to function consistently in a wide range of children's activities; is objective if its functioning is observable by competent teachers and supervisors, if it can be used by competent teachers.

The scale elements presented here are to some extent trustworthy. They are the result of studies of children's activities extending over a period of years. In the first place, they seem to be valid since they have been found to be functioning elements in children's activities. Children seem to have a tendency in pursuing activities to initiate, evaluate, and choose a goal; initiate, evaluate, and choose means in its attainment; execute the means in its attainment; initiate, evaluate, choose, and consummate improvements in its attainments. In the second place, these traits seem to be reliable for they have been found to function consistently in a wide range of activities participated in by more than three hundred children. They seem to be fundamental elements in human conduct. In the third place, these traits have been found objective. Teachers have been able to get comparable results from observing the functioning of these elements in the conduct of boys and girls in school enterprises. In the fourth place, these traits seem to be usable. Teachers have been able to check the several traits in the conduct of boys and girls in carrying forward school enterprises.

The following studies indicate to some extent the trustworthiness of the scale presented here. The first study[2]

[2] Crosby, G. The Reliability, Objectivity, and Usability of a Conduct Scale for the Measurement of Teaching, 1926. (A Master's thesis, The University of Oklahoma.)

sheds some light on the reliability and objectivity of the scale elements. This study extended over a period of one year. It includes a study of the conduct of a group of ninth grade boys and girls in the University High School, University of Oklahoma.

1. Reliability of Scale. The reliability of separate traits of the scale, obtained by correlating the results for the same trait when the scale has been used in two different activities, is expressed by the coefficients in Table VII.

TABLE VII

COEFFICIENTS OF RELIABILITY OF THE SEPARATE TRAITS OF THE ACTIVITY SCALE

Traits	*Coefficient of Reliability*	*Probable Error*
Initiation of Goal..................	.83	.05
Evaluation of Goal...............	.71	.08
Choice of Goal.....................	.61	.11
Initiation of Means...............	.70	.07
Evaluation of Means..............	.80	.05
Choice of Means..................	.81	.05
Organization of Means............	.80	.05
Execution of Means...............	.65	.09
Initiation of Improvement........	.63	.08
Evaluation of Improvement.......	.79	.06
Choice of Improvement...........	.69	.07
Consummation of Improvement....	.58	.11
Leading to Further Goals.........	.40	.12

The coefficient of correlation for each separate trait of behavior indicates a fair degree of reliability of the several traits. The coefficients indicate that most of the traits function quite consistently in a wide range of activities engaged in by children.

2. Objectivity of Scale. The objectivity of the evaluation traits were studied in this instance since they were considered less objective than the other traits of the Scale. The coefficient of objectivity and probable error for each of these traits for four independent scorers, A, B, C, D, is shown in Table VIII.

TABLE VIII

COEFFICIENTS OF OBJECTIVITY OF CERTAIN TRAITS OF THE ACTIVITY SCALE

Scorers	*Traits*	*Coefficient of Objectivity*	*Probable Error*
A–B	Evaluation of Goal..........	.94	.02
A–B	Evaluation of Means........	.98	.01
A–B	Evaluation of Improvement..	.91	.03
A–C	Evaluation of Goal..........	.95	.02
A–C	Evaluation of Means........	.98	.01
A–C	Evaluation of Improvement..	.91	.03
A–D	Evaluation of Goal..........	.96	.01
A–D	Evaluation of Means........	.99	.00
A–D	Evaluation of Improvement..	.75	.07
B–C	Evaluation of Goal.........	.97	.01
B–C	Evaluation of Means........	.97	.01
B–C	Evaluation of Improvement..	.78	.06
B–D	Evaluation of Goal..........	.98	.01
B–D	Evaluation of Means........	.99	.00
B–D	Evaluation of Improvement..	.95	.02
C–D	Evaluation of Goal.........	.96	.01
C–D	Evaluation of Means........	.98	.01
C–D	Evaluation of Improvement..	.92	.02

The high correlation of the evaluation traits, which seems less objective than the other traits, indicates that this Scale can be used by different scorers with high agreement of results. This high correlation of independent scorers seems to indicate a high degree of objectivity.

The second study [3] indicates to some extent the validity of the behavior scale. This study extended over a period of one year. It includes a study of the relationship between the purposeful activity on the part of the pupils and the achievement made by the pupils in the study under way. The achievement, therefore, is the criterion for measuring the

[3] Abbott, T. W. Experimental Study of the Relationship Between Pupil Activity and Achievement, 1928. (Master's Thesis, University of Oklahoma.)

validity of the scale. The following tables and conclusions indicate the correlation between the activity and achievement scores in this study:

TABLE IX

CORRELATION BETWEEN ACTIVITY AND ACHIEVEMENT ON BASIS OF STANDARD TEXT SCORES

Pupils	*Activity*	*Achievement*	*D*	*D²*
W.	1	1	0	0
Le.	2	5	3	9
H.	3	12	9	81
Hu.	4	3	1	1
F.	5	6	1	1
A.	6	2	4	16
R.	7	8	1	1
Ma.	8	7	1	1
V.	9	12	3	9
D.	10	14	4	16
R.	11	15	4	16
E.	12	4	8	64
B.	13	13	0	0
G.	14	10	4	16
H. B.	15	19	4	16
Lu.	16	19	3	9
T.	17	19	2	4
M.	18	17	1	1
Lo.	19	9	10	100
Me.	20	16	4	16
				377

$$r = 1 - \frac{6 \times 377}{20(400-1)}$$

$$r = .717$$

TABLE X

CORRELATION BETWEEN ACTIVITY AND ACHIEVEMENT ON BASIS OF RECORDED GRADES

Pupils	*Activity*	*Achievement*	*D*	*D*²
W.	1	5	4	16
Le.	2	6	4	16
H.	3	10	7	49
Hu.	4	2	2	4
F.	5	7	2	4
A.	6	1	5	25
R.	7	3	4	16
Ma.	8	4	4	16
V.	9	9	0	0
D.	10	11	1	1
R.	11	16	5	25
E.	12	13	1	1
B.	13	14	1	1
G.	14	8	6	36
H. B.	15	12	3	9
Lu.	16	15	1	1
T.	17	17	0	0
M.	18	18	0	0
Lo.	19	19	0	0
Me.	20	20	0	0
				220

$$r = 1 - \frac{6 \times 220}{20(400 - 1)}$$

$$r = .836$$

TABLE XI

CORRELATION BETWEEN ACTIVITY AND ACHIEVEMENT SCORES ON BASIS OF AVERAGE OF RECORDED GRADES AND STANDARD TEST SCORES

Pupils	*Activity*	*Achievement*	*D*	*D²*
W.	1	3	2	4
Le.	2	4	2	4
H.	3	11	8	64
Hu.	4	2	2	4
F.	5	7	2	4
A.	6	1	5	25
R.	7	5	2	4
Ma.	8	6	2	4
V.	9	10	1	1
D.	10	12	2	4
R.	11	15	4	16
E.	12	8	4	16
B.	13	14	1	1
G.	14	9	5	25
H. B.	15	16	1	1
Lu.	16	17	1	1
T.	17	18	1	1
M.	18	20	2	4
Lo.	19	13	6	36
Me.	20	19	1	1
				260

$$r = 1 - \frac{6 \times 260}{20(400-1)}$$

$$r = .724$$

Mr. Abbott concludes as follows: "A study of the activity and achievement scores shows a marked relationship when we consider the group. A few individuals show exceptions. It will be of interest to study these cases.

"W., who ranked first in activity, was rated fifth in the recorded grades. On the standard test he made the highest score. This indicates that his abundant activity raised his achievement above what it would have been with low or average activity. He was an impulsive student, often jumping at conclusions without weighing his words and checking his thoughts and often attempting a proof at its first suggestion to him. His errors in his impulsive and, at times, premature activity no doubt lowered his grades which were turned in by his teacher and supervisor.

"Lo., who ranked nineteenth in activity, was rated nineteenth in the recorded grades, while she scored ninth on the standard test. She was a new student, coming into the class at the beginning of the semester. This strangeness to the school system and to the members of the class together with a retiring disposition tended to keep her activity score low. Evidently she was more active in private study and learned more than her teachers gave her credit for.

"H. ranked third in activity, tenth in recorded grades and twelfth in score on the standard test. Her activity score was high from much discussion in class rather than from the giving of proofs. Her statements were frequently made without sufficient thought. Her activity was thus not of the kind to produce learning.

"A. ranked sixth in activity, first in recorded grades and second in score on the standard test. He was a second-semester addition to the class. He is talented, but has a slight tendency to stammer. His activity was principally in giving complete proofs. His proofs were usually the most difficult theorems and exercises. He kept quiet on the easy theorems and exercises and usually would not volunteer till the other members of the class failed to respond. In his case the system of scoring used did not properly measure his activity. His more difficult problems were entitled to more weight than was provided in the system of scoring.

"G. ranked fourteenth in activity, eighth in recorded grades and tenth in score on the standard test. She is of the quiet type speaking only when she is sure of her ground and then only when others have ceased to talk. She writes neat test papers and takes great pains to make her proofs accurate and complete. These traits possibly caused her teachers to rate her a few places higher in the scale than they otherwise would have done.

"E. ranked twelfth in activity, thirteenth in recorded grades and fourth in score on the standard test. He is handicapped in his activity by being crippled so that he cannot place his own figures on the blackboard. He shows by his attention and facial expression that he is thinking, but he doesn't talk, unless his interest becomes rather strongly aroused. His test papers are not neat. These causes have evidently lowered his rating in the estimation of his teachers. The standard test reveals that he is among the more capable students. His activity score has been kept down by his physical handicap.

"Of the remaining fourteen members of the class the difference between the activity and achievement ranks on the basis of the standard test scores was in no case more than four. Three of these fourteen differed in rank four places; three differed three places; one differed two places; five differed one place; and one held the same rank in both activity and achievement.

"For the group a rather high coefficient of correlation is shown. This coefficient, computed by the rank difference method, is 0.836 between the activity scores and the recorded grades of the pupils. Between the activity scores and scores made on the standard test a coefficient of 0.717 is shown. A third coefficient was computed which showed a correlation of 0.724 between the activity scores and the averages of the recorded grades and the standard test scores."

The group involved in this study is small and hence the method of computing the coefficients of correlation, namely, the rank difference method, is less rigorous and the results less reliable than would be the case if it had been larger. Nevertheless, the results tend to show that the Activity Scale is a valid measure of the behavior of boys and girls.

CHAPTER XXII

MEASUREMENT OF CHANGES IN PURPOSIVE BEHAVIOR: USES OF THE ACTIVITY SCALE

1. **Line of Measurement.** There are, as we have seen, three lines of the measurement of changes in purposive behavior. The first line yields changes in the drives and responses of boys and girls along particular traits of purposive behavior. The Drive and Response Indexes for a particular trait, say, initiation of goal, reveal changes along this line. The second line yields changes in the drives and responses of boys and girls along a selected combination of traits of purposive behavior. The Drive and Response Indexes for a selected combination of traits, say, initiation of means, evaluation of means, and choice of means, reveal changes along this line. The third line yields changes in the Drive and Responses of boys and girls along all the traits of purposive behavior. The Drive and Response Indexes for each of the several traits reveal changes along this line. The third line of measurement was selected in this illustration, namely, measurement of changes along all the traits of purposive behavior.

2. **Selection of Activities.** There are, as we have seen, five lines of purposive behavior. They are: the Excursion Activity, the Communication Activity, the Construction Activity, the Play Activity, and the Skill Activity. The Construction Activity was selected in this illustration,

namely, How John Made His Sled (Initial Activity) and How John Made His Wagon (Final Activity).

3. **Preparing the Activity Score Card.** The Activity Score Cards[1] include, in the first place, the traits of purposive behavior. These traits are listed horizontally at the top of the card. In the second place, it includes the Drive and Response arranged vertically in the form of "D" and "R" for each of the traits. Space is also provided on the card for the names of pupils, teacher, activity, date, grade, and scores. The name of the pupil, teacher, activity, grade, and date in this illustration were filled in the places provided for on two Activity Score Cards—one for the Initial Activity and one for the Final Activity. These Score Cards are shown in Figures 16 and 18.

4. **Scoring Drives and Responses.** Response is the participation of a child along the traits of purposive behavior. It is seen in the pupil's overt participation in the initiation of goal, evaluation of goal, choice of goal, initiation of means, evaluation of means, choice of means, execution of means, initiation of improvement, evaluation of improvement, choice of improvement, and consummation of improvement. Drive is voluntary participation on the part of the pupil along the traits of purposive behavior. It is seen in the voluntary character of a pupil's response in the initiation of goals, evaluation of goals, choice of goals, initiation of means, evaluation of means, choice of means, execution of means, initiation of improvement, evaluation of improvement, choice of improvement, and consummation of improvement. The teacher records each drive and response at the time they occur in the class work with a tally mark oppo-

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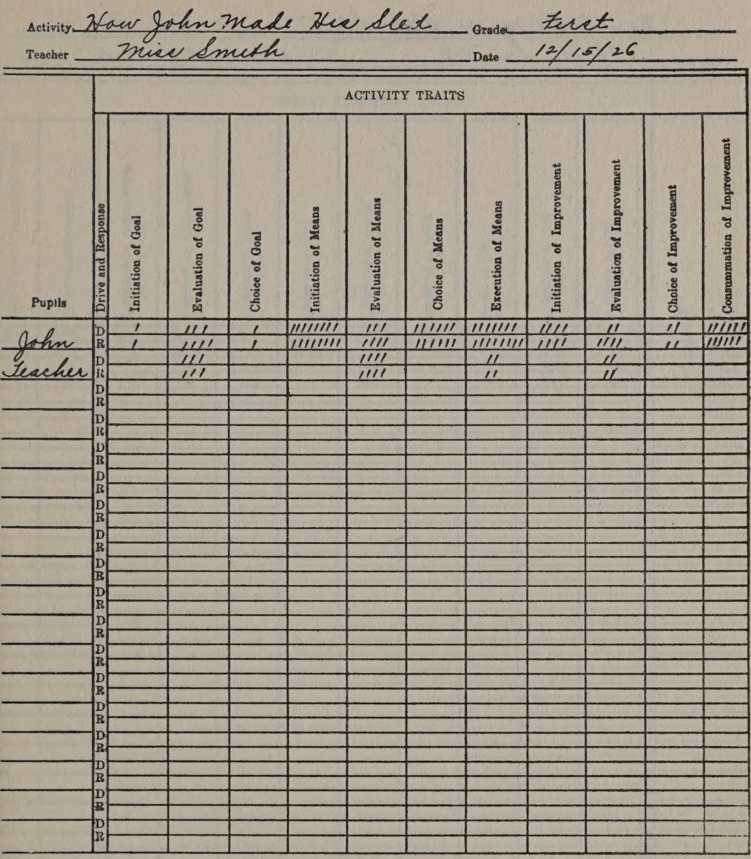
[1] Collings, E. Conduct Scale for Measurement of Teaching, 1927. Edwards Brothers.



Activity How John Made His Sled Grade First

Teacher Miss Smith Date 12/15/26

		ACTIVITY TRAITS										
Pupils	Drive and Response	Initiation of Goal	Evaluation of Goal	Choice of Goal	Initiation of Means	Evaluation of Means	Choice of Means	Execution of Means	Initiation of Improvement	Evaluation of Improvement	Choice of Improvement	Consummation of Improvement
John	D	/	///	/	////////	///	//////	////////	////	//	//	///////
	R	/	////	/	/////////	////	///////	/////////	////	////	//	///////
Teacher	D		///			////		//		//		
	R		///			////		//		//		
	D											
	R											
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FIGURE 16.—The Activity Score Card for Scoring "How John Made His Sled".

site the pupil's name under the appropriate activity trait on the score card. The method of scoring is the same for both individual and group activity.

In this illustration the drives and responses of the pupil were recorded with a tally mark along all the traits of

Activity How John Made His Sled Grade First
Teacher Miss Smith Date 12/15/26

		ACTIVITY TRAITS										
Pupils	Drive and Response Index	Initiation of Goal	Evaluation of Goal	Choice of Goal	Initiation of Means	Evaluation of Means	Choice of Means	Execution of Means	Initiation of Improvement	Evaluation of Improvement	Choice of Improvement	Consummation of Improvement
John	D	100	75	100	100	75	100	87	100	50	100	100
	R	100	57	100	100	50	100	80	100	66	100	100
Teacher	D	0	100	0	0	100	0	100	0	100	0	0
	R	0	43	0	0	50	0	20	0	34	0	0
	D											
	R											
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FIGURE 17.—The Activity Index Card for Scoring "How John Made His Sled".

purposive behavior at the time they occurred in both the Initial and Final Activities. The scores are shown in Figures 16 and 18.

Activity How John Made His Wagon Grade First
Teacher Miss Smith Date 9/12/26

Pupils	Drive and Response	ACTIVITY TRAITS										
		Initiation of Goal	Evaluation of Goal	Choice of Goal	Initiation of Means	Evaluation of Means	Choice of Means	Execution of Means	Initiation of Improvement	Evaluation of Improvement	Choice of Improvement	Consummation of Improvement
John	D	/	/////	/	/////////	////////	/////////	//////////	/////	////	//	//
	R	/	///////	/	//////////	//////////	//////////	//////////	/////	//////	//	//
Teacher	D		/			//		/		/		
	R		/			//		/		/		
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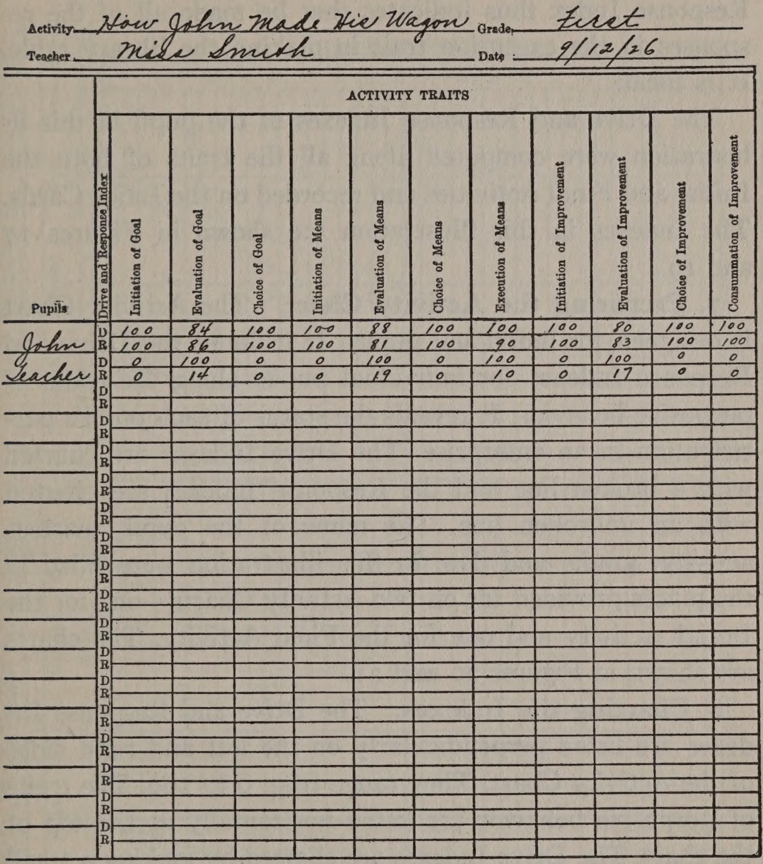
FIGURE 18.—The Activity Score Card for Scoring "How John Made His Wagon".

5. Preparing the Index Card. The Activity Index Card is to record the Drive and Response Index of each pupil along the traits of purposive behavior. It includes, first, the traits of purposive behavior arranged horizontally across the top of the card, and second, the Drive and Response

Indexes arranged perpendicularly on the left side of the card. In addition, space is provided for the names of the pupil, teacher, grade, date, and the Drive and Response Indexes for each trait. The Drive and Response Indexes are recorded in the space labeled "D" and "R" following each pupil's name under the appropriate traits. The name of the pupil, teacher, activity, grade, and date in this illustration were filled in the places provided for on two Activity Index Cards—one for the Initial Activity and one for the Final Activity. The Index Cards are shown in Figures 17 and 19.

6. **Computation of Indexes.** There are two formulae used in computing the Indexes. The first is the Drive Index Formula. It is: D.I. equals $\frac{D}{R} \times 100$. The "D" is a symbol for the total number of drives obtained by a pupil for any particular trait of purposive behavior. The "R" is a symbol for the total responses obtained by a pupil for any particular trait. For example, John has 8 drives and 8 responses in the initiation of means in the construction of a sled. His Drive Index is 8 divided by 8 multiplied by 100 giving 100. The second is the Response Index Formula. The Response Index for individual activity is obtained by dividing the responses actually made by a pupil in a trait by the total number of responses made in carrying forward the trait successfully. The formula is: Response Index equals $\frac{PR}{PR + TR} \times 100$. (PR is symbol for pupil response; TR is symbol for teacher response.) A Response Index of 100 is ideal. It indicates the pupil made all the responses in carrying forward a trait of purposive behavior. The following illustrates the method for computing the Response Index for an individual



Activity: How John Made His Wagon Grade: First

Teacher: Miss Smith Date: 9/12/26

		ACTIVITY TRAITS										
Pupils	Drive and Response Index	Initiation of Goal	Evaluation of Goal	Choice of Goal	Initiation of Means	Evaluation of Means	Choice of Means	Execution of Means	Initiation of Improvement	Evaluation of Improvement	Choice of Improvement	Consummation of Improvement
John	D	100	84	100	100	88	100	100	100	80	100	100
	R	100	86	100	100	81	100	90	100	83	100	100
Teacher	D	0	100	0	0	100	0	100	0	100	0	0
	R	0	14	0	0	19	0	10	0	17	0	0
	D											
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FIGURE 19.—The Activity Index Card for Scoring "How John Made His Wagon".

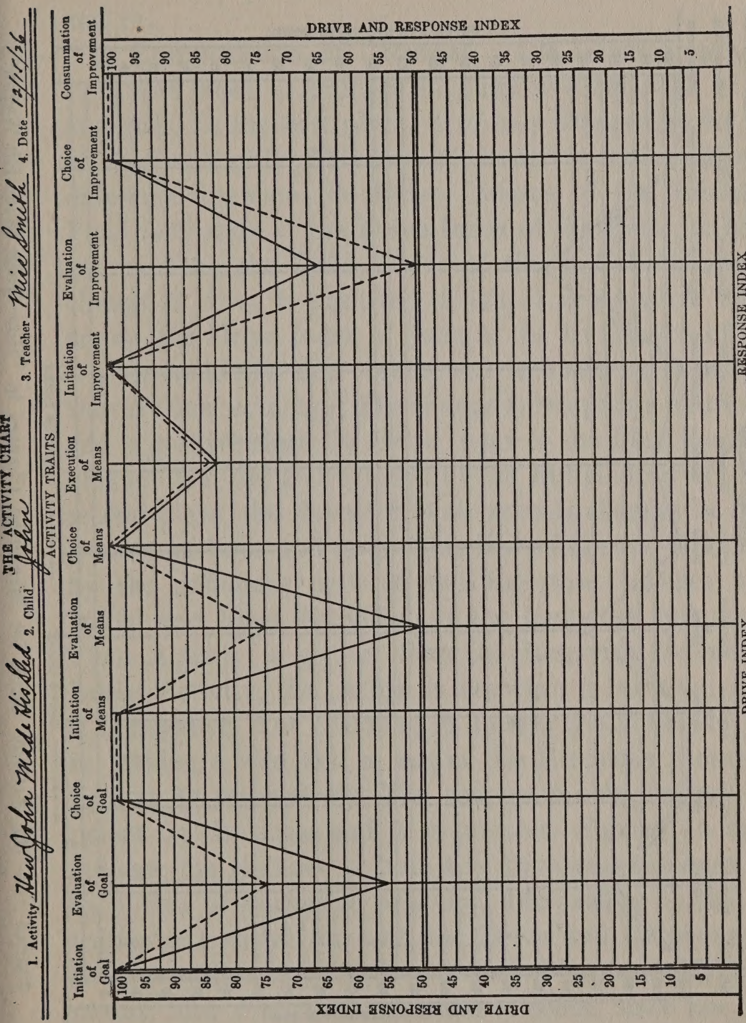
activity: Suppose Willie's score shows he made 300 responses in the execution trait of, say, a library table, and that there were 300 responses involved in the successful performance of this trait. His Response Index is equal to 300 divided by 300 multiplied by 100 giving 100. Willie's

Response Index thus indicates that he made all of the responses in the execution trait in making the library table. It is ideal.

The Drive and Response Indexes of the pupil in this illustration were computed along all the traits of both the Initial and Final Activities and recorded on the Index Cards. The Indexes in this illustration are shown in Figures 17 and 19.

7. **Preparing the Activity Chart.** The Activity Chart is designed for individual pupils. It includes the Drive and Response Indexes for individual pupils along the traits of purposive behavior. It reveals the status of each pupil's participation in an enterprise. The Drive Indexes are charted with a broken line and the Response Indexes are charted with an unbroken line. The name of the pupil, teacher, activity, grade, and date in this illustration were filled in the places provided for on two Activity Charts—one for the Initial Activity and one for the Final Activity. The charts are shown in Figures 20 and 21.

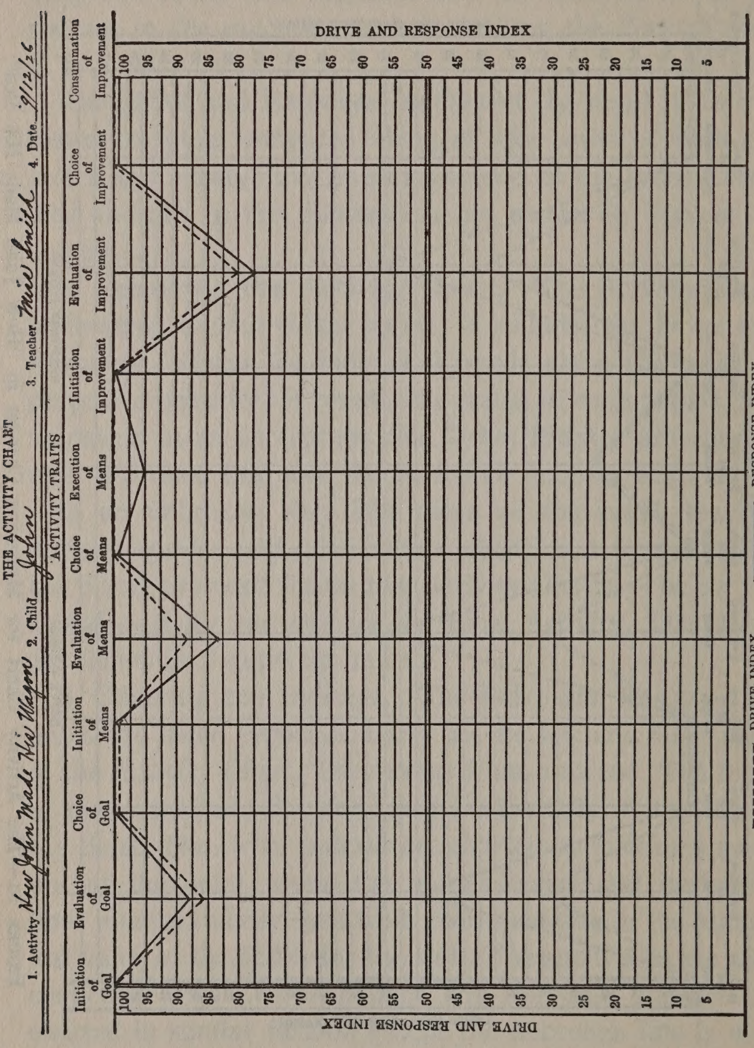
8. **Charting the Indexes.** The Drive and Response Indexes are listed perpendicularly on the left and right sides of the Activity Chart. They range from 0 to 100. The traits of purposive behavior are listed horizontally at the top of the chart. The Drive Indexes are charted by making a small dot at the point where the perpendicular and horizontal lines intersect under each trait, corresponding to the numerical value of the Index for the trait. The small dots are then connected with a broken line. The Response Indexes are charted in similar fashion except the unbroken line is used in making the chart. The Drive Index and the Response Index in this illustration were charted for both the Initial



THE ACTIVITY CHART

1. Activity How John Made His Sled 2. Child John 3. Teacher Miss Smith 4. Date 12/1/26

FIGURE 20.—The Activity Chart for Measuring Changes in "How John Made His Sled".



THE ACTIVITY CHART

1. Activity How John Made His Wagon 2. Child John 3. Teacher Miss Smith 4. Date 9/12/26

FIGURE 21.—The Activity Chart for Measuring Changes in "How John Made His Wagon".

and Final Activities. The charts are shown in Figures 20 and 21.

9. **Computation of Changes.** The Behavior Scale reveals two lines of changes in purposive behavior of boys and girls. In the first place, it reveals changes in the drive of boys and girls. This line of change is indicated by the difference between the Drive Indexes of the Initial and Final Activities. If the Drive Index of the Final Activity is greater than the Drive Index of the Initial Activity, the change in drive is positive; if less, it is negative. For example, the Drive Index of John in the Evaluation of Goals is 75 in making a sled (initial activity) and 85 in making a wagon (final activity). The change is ten points on the scale and is positive since the Drive Index of the Final Activity is greater than the Drive Index of the Initial Activity. In the second place, the Behavior Scale reveals changes in the responses of boys and girls. This line of change is indicated by the difference between the Response Indexes of the Initial and Final Activities. If the Response Index of the Final Activity is greater than the Response Index of the Initial Activity, the change in response is positive; if less, it is negative. For example, in John's Evaluation of Goals in making a sled and a wagon the Response Indexes are 55 and 87 respectively. The change in this instance is 32 points on the scale and it is positive. Figures 20 and 21 indicate the changes in both the drive and response along each trait of purposive behavior. The change in this illustration is positive for both the Drive and Response along the evaluation of goals, evaluation of means, execution of means, and evaluation of improvements, since the Drive and Response Index along these traits are greater for the Final Activity than for the Initial Activity.

CHAPTER XXIII

MEASUREMENT OF CHANGES IN PURPOSIVE BEHAVIOR: MISCELLANEOUS MEANS

1. Three Fundamental Principles in the Measurement of Changes in Purposive Behavior. The rôle of measurement in education is to aid the teacher in the proper stimulation and direction of the activities of boys and girls. It reveals weak points and strong points in child activity to which the teacher may direct her attention in order that the growth of the children may take place at a normal rate and that it may be as complete as possible.

As was pointed out in Chapter XXI, certain criteria are usually laid down for the construction of measuring devices or tests. First, the test should be usable. It should be practical from the standpoint of its administration and scoring. Second, the test should be valid, that is, it should measure what it purports to measure. The results obtained by a given test should correlate highly with the results of some infallible measure of the activity in question which can be taken as a criterion. Third, the test should be reliable. It should measure not only what it purports to measure but it should measure this trait consistently. It should measure the same trait or function every time it is used and the results obtained by the use of one part of the test should correlate highly with those obtained by the use of another part. Fourth, the test should be objective. In evaluating the results of the test, the bias of the teacher should be reduced to the minimum. The basis of evaluation should be so clearly outstanding that a number of unbiased judges would arrive independently at the same results.

The above criteria or principles underlying the construction of measuring devices in the field of education are sound, but they are, within themselves, incomplete. There are three other principles which are usually neglected. These principles will now be considered very briefly.

(1) Measure Changes in Behavior and not the Perfection of End-Results. A first principle in the construction of a measuring device is to measure changes in purposive behavior and not the perfection of end-results or goals. The teacher should not be concerned so much with how well John can construct a bookcase at the completion of this line of purposive activity, but rather she should be concerned with the amount of improvement which John has shown during the series of responses resulting in the consummation of this act. The question to be considered is, not how well Mary can make a dress, decorate a flower vase, tell a story, write a letter, or play The Star-Spangled Banner on the piano, but how much she has improved in these lines of activity during a given period of time.

Children differ in their initial ability to solve problems along any given line of behavior. Henry is able at the beginning to build a bookcase which would be rated as twice as good as that built by John. But at the end of the school year, John's workmanship is as good as that of Henry. In this case it would be a very unsatisfactory program of measurement which took into account only the degree of perfection of the finished product. On this basis Henry and John would receive the same standing. But in reality John's growth in the activity of building a bookcase has doubled that of Henry. Relatively speaking the efforts of the teacher in stimulating and directing the activities of these two boys along this line of activity has been much more successful with John than with Henry, despite the fact that the final measurements reveal an equal degree of proficiency.

Growth takes place and perfection is achieved through progressive changes in purposive behavior. Emphasis should be placed, in the stimulation and direction of children's activities, upon these progressive changes in behavior. And it is through the measurements of these changes that the teacher can determine where guidance and direction are needed, both with respect to differences found in individual children and to unevenness found within the same child.

(2) Measure Changes in Terms of Units of Purposive Behavior and Not in Terms of Detached Responses. It was pointed out in Chapter VII that the child reacts as a unit in purposive behavior. It is the whole child which is involved in building a bookcase, making a dress, playing tennis, or writing a letter. It is the purpose of the teacher to provide conditions under which the children can participate in various units of purposive activity and to stimulate and direct their behavior within these units so that success will attend their efforts.

The teacher can evaluate the efficiency of her stimulation and guidance of the purposive behavior of boys and girls by measuring the changes which take place from time to time. But these measurements must be made in terms of the units of purposive activity in which the boys and girls normally engage. This is a second fundamental principle underlying the construction of a device for measuring changes in purposive behavior.

Much of the present movement toward the scientific measurement of results of teaching has involved the use of isolated forms of child behavior. This is due partially to the fact that the proponents and leaders of the measuring movement have been mainly concerned with the phase of objectivity in measurement. This concern is highly commendable but it is inadequate. It overlooks the dynamic nature of boys and girls. The teacher should not be concerned alone with how well John can add, subtract, multiply, and divide, but what changes he has made in his ability to compute the cost of his bookcase; not how well he can make the various forms of letters in handwriting but what changes he has made in his ability to write a letter; not how well he can conjugate verbs, decline modifiers, and define words, but what improvement has he made in his ability to tell a story; not how well he can use a hammer, a plane, and a saw, but what improvements he has made in his ability to make a bookcase.

(3) Measure Changes in Both the Drive and the Response in Purposive Behavior. It was shown in the third section of the book that purposive behavior is composed of two phases, the drive and the response. It was indicated in Chapter VIII that both of these phases could be conditioned under the proper conditions of stimulation and direction. Now, in measuring growth in purposive behavior, the teacher must measure changes in both the drive and the response. This is a third fundamental principle in constructing means of measuring changes in purposive behavior.

In most of the attempts to measure the outcome of education the emphasis has been entirely upon changes in responses of children to the gross neglect of the drive aspect of behavior. As was indicated above, this has been due partly to the fact that the proponents of the testing movement have been concerned with keeping the means of measurement on a purely objective basis. This is a commendable ideal, since the very essence of scientific procedure is objectivity in securing and treatment of data. But it is the thesis of the present section of the book that any testing program which measures only the primary changes or changes in the responses of boys and girls is only a half program. Measurement also must be made of the concomitant changes or changes in the drives of behavior as well. This phase of behavior changes is more difficult to measure, which is partly responsible for its neglect, but the responsibility for this kind of measurement rests squarely, nevertheless, upon the shoulders of the teacher and others who are concerned with directing the growth of boys and girls.[1]

2. Means of Measuring Primary or Response Changes in Purposive Behavior. As has been pointed out before, most of the present testing movement is concerned with changes in the responses of children. The main criticism of tests of this kind is that they are used to measure changes in responses which are entirely divorced from the purposive and unitary characteristics of child behavior. The plea to be held forth here is that the tester find complete or unit activities in which the children normally engage in order that he may apply his measuring rod. As was pointed out above, it matters little how well John can add, subtract, multiply and divide in isolated and piecemeal activities if he cannot solve a vital problem involving the use of these processes; it matters little how well he can define words, conjugate verbs, and decline modifiers, if he cannot use these means correctly in communication with other individuals; it matters little how well he can spell the words in a spelling assignment if he does not correctly use these words in preparing his written stories or in writing letters.

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[1] The possibility and a method of measuring drives (attitudes) are discussed by Thurstone, L. L. "Attitudes Can Be Measured." Amer. J. Sociol., 1927-1928, 33, 529-554.

It is not the purpose of this chapter to design measuring devices which will fulfil the needs pointed out here, but rather to point out some of the neglected aspects of measurement and to suggest ways and means by which certain prevailing shortcomings may be overcome. Many of the standard methods of measuring outcomes in education could be used for the purpose discussed here, since they can be used in the broader phases of units of purposive behavior. Others are hopelessly inadequate, since they are too narrow in their scope and are concerned with the most abstract, isolated, stereotyped forms of behavior. The child may make a high score on these tests and yet fail miserably in the solution of a unit problem where the same processes of activity are involved. Since it is the goal of the teacher to secure as great improvement as possible in the purposive behavior of boys and girls rather than to reach certain degrees of proficiency, more of the responsibility should rest upon her shoulders in constructing the needed measuring devices. She must be concerned more with the measurements of improvement in the particular lines of activity in which her boys and girls engage and less with the state and national norms of standardized tests so numerous at the present time.

Having before us the above suggestions concerning the use to be made of measuring devices in determining the growth of child behavior and the part the teacher has to play in their usage, we may now illustrate the use of a few common measuring devices as follows: True-false tests, multiple choice tests, and performance tests. But keep in mind, we must have a given unit of purposive behavior to be measured and not merely certain isolated responses which are foreign to purposive activities of boys and girls. This unit may be along any one of the lines of purposive behavior discussed in Chapter XIII, namely, excursion activities, communication activities, construction activities, play activities, and skill activities.

(1) Illustrations of the Use of Certain Devices for Measuring Changes in Responses in Purposive Behavior. Let us suppose that the line of activity in which the teacher's children are engaged is that of communication. The particular unit on which the children have agreed to work is the dramatization of "Enoch Arden." The teacher desires to determine to what extent her children will improve with respect to their responses to this piece of literature. She may wish to determine the extent to which they have gained certain facts concerning the story or have become familiar with the lessons the author desired the reader to glean from reading it. Improvement in the behavior of the boys and girls in these respects can be measured by the administration of an initial test and a subsequent test in the form of any of the devices mentioned above. The differences between the standing of each child in the initial test and the subsequent tests, which are the same as or similar to the initial test, will show the growth in this particular unit of purposive activity. Let us illustrate how these various measuring devices can be used to determine the growth of the behavior of a class of girls and boys with respect to their responses to "Enoch Arden."

(a) The Use of the True-False Test in Measuring Changes in Responses in the Dramatization of "Enoch Arden." The

true-false test is made up of a number of statements concerning the activity in question, half of which are true and half of which are false. The order of the true and the false statements should be random so as to prevent the child from determining by any mathematical means which are true and which are false. As the teacher prepares her list of statements she notes down the correct answers in the form of a key which is to be used in scoring the papers. One of the most convenient forms of the true-false tests is the one shown in Figure 23. The key is shown in Figure 22, in which are marked the correct answers for the statements in the test illustrated. In checking the responses, the key, which is a correctly marked copy of the test handed to the children, is placed alongside the left margin of the test so that the corresponding numbers are adjacent to each other. Then, the responses of the children which are incorrect are indicated by a check mark.

The total score on the true-false test is the total number of correct responses minus the total number of wrong responses (R — W). The reason for this method of scoring is properly to treat the score for any guessing the child may do. Theoretically the child who had never heard of "Enoch Arden" could guess correctly the response to 50% of the statements, since the responses fall into only two categories, namely, true and false. If there were fifty statements in the test, the child, theoretically at least, could make correct responses to twenty-five statements. The score for this individual should be zero, which is what he would receive if the method of computing the final score mentioned above is used, since it is readily seen that 25 — 25 = 0.

According to this method of scoring the papers it may frequently occur that a child will receive a negative score.

TRUE-FALSE TEST ON ENOCH ARDEN

NAME Smith, John.. GRADE VIII... SCORE: R(22) -W(4) = SCORE 18

DIRECTIONS: IF A STATEMENT BELOW IS TRUE, ENCIRCLE (T); IF IT IS FALSE ENCIRCLE (F).

1. [✓ T] F	1. T [✓ F] ✓	Enoch Arden was an orphan.
2. T [✓ F]	2. T [✓ F]	Philip Ray was larger and stronger than Enoch.
3. T [✓ F]	3. T [✓ F]	Annie Lee seldom played with the two boys.
4. [✓ T] F	4. [✓ T] F	Philip Ray was a miller's only son.
5. T [✓ F]	5. T [✓ F]	When Enoch grew up, his ambition was to go to college.
6. T [✓ F]	6. T [✓ F]	The first seven years of married life of Enoch and Annie were years of trouble.
7. T [✓ F]	7. [✓ T] ✓ F	Enoch Arden was a merchant.
8. T [✓ F]	8. T [✓ F]	Enoch was always prosperous.
9. [✓ T] F	9. [✓ T] F	Enoch and Annie had three children.
10. [✓ T] F	10. T ✓ [✓ F]	Enoch went on a voyage to China.
11. T [✓ F]	11. T [✓ F]	He was captain of the ship on which he sailed.
12. T [✓ F]	12. T [✓ F]	All were drowned in a shipwreck except Enoch and five others.
13. T [✓ F]	13. T [✓ F]	Enoch was on the island fifteen years before help came.
14. T [✓ F]	14. T [✓ F]	Those who were saved with him were killed by Indians.
15. [✓ T]	15. [✓ T]	Enoch alone was rescued from the island.

Figure 22. Key for True-False Test on "Enoch Arden."

Figure 23. Specimen of a True-False Test on "Enoch Arden" for Junior High School Children.

16. T [✓ F]	16. T [✓ F]	The ship which rescued him stopped near the island because she saw his signals for help.
17. T [✓ F]	17. T [✓ F]	The men who came ashore were English.
18. [✓ T] F	18. [✓ T] F	Annie proved a failure as a merchant during Enoch's absence.
19. [✓ T] F	19. T [✓ F] ✓	When Enoch reached his home, he found it deserted.
20. [✓ T] F	20. [✓ T] F	Miriam Lane did not recognize Enoch when he first came to the inn.
21. [✓ T] F	21. [✓ T] F	Enoch did not make his presence known to Annie.
22. [✓ T] F	22. [✓ T] F	He lived about a year after his return.
23. [✓ T] F	23. [✓ T] F	He died blessing Annie and his children.
24. [✓ T] F	24. [✓ T] F	Enoch proved to Miriam Lane his identity by showing her the lock of the baby's hair.
25. T [✓ F]	25. [✓ T] F	Enoch wanted Annie to come to his funeral.
26. [✓ T] F	26. [✓ T] F	His last words were, "A sail! A sail! I'm saved!"

Figure 22. Key for True-False Test on "Enoch Arden." *Continued*

Figure 23. Specimen of a True-False Test on "Enoch Arden" for Junior High School Children. *Continued*

This need not disturb the teacher; it does not mean that the child receiving this score knows less than nothing about "Enoch Arden." It simply means that the distribution of right and wrong answers deviates slightly from the fifty-fifty relationship, especially in a small number of questions. If such scores occur, and they frequently do, the teacher should count as the lowest score the highest negative score. The next lowest score will be the next highest negative score, and so on in ascending order until the highest score is reached which is the highest positive score. For example, the following scores were made on an initial true-false test one day by a group of children: 20, 18, 17, 15, 11, 7, 4, 3, 3, 2, 2, 2, 1, 1, 1, 0, 0, 0, 0, 0, 0, —1, —1, —2, —3, —3, —3, —3, —4, —4, —5, —6. The lowest score in this series is —6, the next lowest is —5, and the highest is 20. In order for the teacher to measure the growth of children in their responses to "Enoch Arden," as they approach the consummation of this unit of purposive activity, she should give the children subsequent tests, either the same test repeated the required number of times or an equally difficult form of the same test. The teacher may use the same test both at the beginning and at the end of the activity. This has one limitation, namely, the scores will be slightly higher the second time than they were the first merely because the test has been taken a second time. This is not a serious limitation, however, since all of the children will have had the same advantage in the repetition of the test and their improvement will be relatively the same as if two distinct tests were used. If the teacher desires to have a final test which is distinct from the initial test and yet quite similar and approximately equal to it, she may prepare, say, two hundred true-false statements on "Enoch Arden" and then arrange them in random order. Now, if she selects alternately the statements for the two tests, putting the first statement in one test and the next statement in the other test, she will have two tests which are quite similar, approximately equal, but entirely distinct in so far as the specific statements are concerned. The only precaution to be taken here is that there should be an equal number of true and false statements in the one test and an equal number of true and false statements in the other. The difference between the scores on the initial and final test for a given child will represent the change in the responses of that child with respect to "Enoch Arden." The child which achieves the greatest growth in this activity is the child which has the highest difference in the two scores.

(b) The Use of the Multiple Choice Test in Measuring Changes in Responses in the Dramatization of "Enoch Arden." The multiple choice test is made up of a number of questions, incomplete statements, or other expressions for which there is indicated a number of responses. One of these responses answers the question most accurately or completes the statement most adequately and is to be indicated by the child according to the directions in the test. The position of the correct response in the multiple of responses should be varied so that the child will not be able to determine by any rule which is the correct response. The responses in this test are checked by references to a key similar to that used in the true-false test. A sample of this type of measuring device is shown in Figure 25. The corresponding key is shown in Figure 24, which is self-explanatory.

The final score on this test is the total number of correct responses. The element of making the correct responses on this test by mere chance selection is greatly reduced, since the child is required to select one response from among several other responses. The number in the multiple of responses should be the same for each expression.

As was stated in connection with the true-false test, several forms of the multiple choice test can be constructed so that they will be of approximately equal difficulty. These tests can be administered as initial tests and final tests, and their results compared with respect to each individual child. The difference between the scores achieved on the initial and the final forms will indicate the degree of improvement.

MULTIPLE CHOICE TEST ON ENOCH ARDEN

Name .... Grade...... Score......

Directions: In the parenthesis at the left of each statement put the number of the word or group of words which will most accurately complete the statement.

1. (4)	1. (2) V	This story takes place (1) in the city, (2) on an island, (3) in the mountains, (4) in a village by the sea.
2. (3)	2. (2) V	Philip Ray was the son of (1) a doctor, (2) a sailor, (3) a miller, (4) a clergyman.
3. (2)	3. (2)	Philip Ray, Annie Lee, and Enoch Arden played at (1) store, (2) keeping house, (3) war, (4) mumblepeg.
4. (3)	4. (3)	Enoch proposed to Annie (1) at a dance, (2) on the beach, (3) on a nutting party, (4) on a boat.
5. (3)	5. (1) V	When Enoch grew up, he saved his money to buy (1) a boat, (2) a farm, (3) a home for Annie, (4) a horse.
6. (1)	6. (1)	Enoch was prosperous (1) for the first seven years of his married life, (2) all his life, (3) until he went abroad, (4) not at all.
7. (2)	7. (2)	He made a voyage (1) for pleasure, (2) to obtain riches, (3) for his health, (4) to visit relatives.
8. (3)	8. (2) V	His ship sailed (1) to India, (2) to Africa, (3) to China, (4) to America.

Figure 24. Key for Multiple Choice Test on "Enoch Arden."

Figure 25. Specimen of a Multiple Choice Test on "Enoch Arden" for Junior High School Children.

MULTIPLE CHOICE TEST ON ENOCH ARDEN—*Continued*

9. (2)	9. (2)	While Enoch was away, Annie made a living by (*1*) sewing, (*2*) keeping store, (*3*) teaching school, (*4*) nursing.
10. (4)	10. (2)	While Enoch was away, Annie (*1*) was moderately prosperous, (*2*) grew wealthy, (*3*) failed in business, (*4*) barely managed to live.
11. (*1*)	11. (3)	Philip Ray helped her by (*1*) sending the children to school, (*2*) paying the rent, (*3*) giving the children work, (*4*) giving her money.
12. (*1*)	12. (*1*)	Annie decided Enoch was dead (*1*) because of a dream, (*2*) because of a sign from the Bible, (*3*) because Philip thought he was dead, (*4*) because of a report.
13. (*1*)	13. (*1*)	Enoch was saved by a ship which landed (*1*) to hunt water, (*2*) to search for gold, (*3*) to explore the island, (*4*) to secure slaves.
14. (3)	14. (3)	When he reached his home, he found (*1*) his family, (*2*) strangers, (*3*) an empty house, (*4*) ashes.
15. (4)	15. (3) V	He went to live (*1*) with friends, (*2*) with relatives, (*3*) alone, (*4*) at Miriam Lane's tavern.
16. (4)	16. (4)	After a few days he (*1*) went to see Philip alone, (*2*) visited the entire family, (*3*) let Annie know of his presence, (*4*) stole secretly at night to watch them in their home.
17. (*1*)	17. (2)	His occupation after his return was (*1*) carpenter, (*2*) fisherman, (*3*) boat captain, (*4*) farmer.
18. (3)	18. (3)	Miriam Lane was (*1*) reserved and quiet, (*2*) ill-tempered, (*3*) talkative, (*4*) unkind.
19. (*1*)	19. (2) V	Enoch at his death asked (*1*) that the children attend the funeral, (*2*) that only Annie come, (*3*) that Philip come, (*4*) that no one should know of his death.
20. (4)	20. (*1*) V	His funeral was (*1*) very poor, (*2*) moderately expensive, (*3*) costly, (*4*) very costly.

Figure 24. Key for Multiple Choice Test on "Enoch Arden." *Continued*

Figure 25. Specimen of a Multiple Choice Test on "Enoch Arden" for Junior High School Children. *Continued*

(c) The Use of the Completion Test in Measuring Changes in Responses in the Dramatization of "Enoch Arden." The completion test may be in the form of a narrative concerning an event, character, or condition, in which certain vital parts are omitted. It is required of the

child to fill in the missing parts, so as to make the narrative run smoothly and accurately. An example of this form of test used in the study of "Enoch Arden" is shown in Figure 27 and the corresponding key is shown in Figure 26. The key is placed alongside the narrative so that the responses in the key are adjacent to the corresponding responses in the narrative, and the incorrect responses in the test are checked as in the tests previously described. The final score is the total number of correct responses. It is more difficult to prepare two forms of this test which will be approximately equal in difficulty, than was the case in the other tests described. For purposes of comparison of initial responses with final responses, the same form may be repeated in the final test.

(d) The Use of a Battery of Tests in Measuring Changes in Responses in the Dramatization of "Enoch Arden." If the teacher desires to prepare a more comprehensive test on "Enoch Arden" than any one of the tests described, she can put two or more of them together in the form of a battery. The total score on the battery of tests will be the sum of the scores on the individual tests.

(e) The Use of the Essay Test in Measuring Changes in Responses in the Dramatization of "Enoch Arden." The Essay test is familiar to everyone, since it is the one that is generally used in measuring achievement. It is made up of written responses of the children to certain questions which are asked by the examiner. This form of test is the least satisfactory for the purpose under discussion, for at least four reasons. First, it is difficult to make this test sufficiently comprehensive because it requires much time for the children to write out their responses. With one of the forms described above the teacher can secure more information

NARRATIVE COMPLETION TEST ON ENOCH ARDEN

NAME. John Smith.. GRADE VIII.... SCORE. 46.....

DIRECTIONS: IN EACH OF THE PARENTHESES AT THE LEFT WRITE THE ONE WORD WHICH IS OMITTED IN THE CORRESPONDING NUMBERED BLANK OF THE TEST.

1	(village)	(town) ✓
2	(miller's)	(fisherman's ✓
3	(keeping)	(keeping)
4	(house)	(house)
5	(Enoch)	(Philip) ✓
6	(peace)	(peace)
7	(Enoch)	(Philip) ✓
8	Philip)	(Enoch) ✓
9	fishermans	(fisherman
10	(boat)	(boat)
11	Philip)	(Philip
12	(Enoch)	(Enoch)
13	(seven)	(seven)
14	daughter)	daughter
15	(son)	(son)
16	(mast)	(bridge ✓
17	(leg)	(arm) ✓
18	(less)	(less)

Figure 26. Key for completion test on "Enoch Arden."

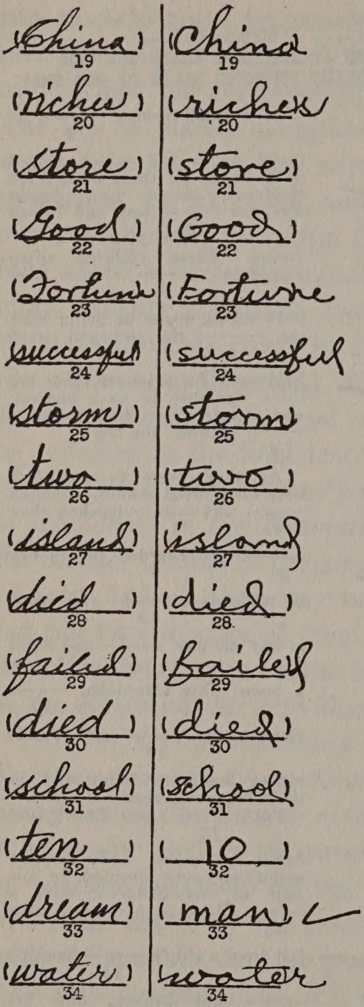
In a small fishing ——— 1 located on a hill which sloped down to the sea there lived three children: Annie Lee, Philip Ray, the ——— 2 son, and Enoch Arden. These children often played at ——— 3 ——— 4, the boys taking turns at being master. ——— 5, the stronger, often held sway for a longer time; but there was sure to be a quarrel, and Annie often had to make ——— 6 between the boys.

As they grew to manhood, both boys loved Annie, although ——— 7 was more outspoken than ——— 8. He hoarded the money he made as a ——— 9 and sailor to buy his own ——— 10 and build a home. One afternoon, ——— 11 came upon ——— 12 and Annie sitting hand in hand and in their happiness read his doom.

For ——— 13 years Enoch and Annie prospered and Enoch's ambitions were aroused in behalf of his children, first a ——— 14 and then a ——— 15. In a fall from a ship's ——— 16 Enoch's ——— 17 was broken, and his forced inactivity caused his business to be ——— 18 prosperous.

Figure 27. Specimen of a Narrative Completion Test on "Enoch Arden" for Junior High School Children.

NARRATIVE COMPLETION TEST ON ENOCH ARDEN—*Continued*



(China) 19	(China 19
(riches) 20	(riches 20
(store) 21	(store) 21
(Good) 22	(Good) 22
(Fortune 23	(Fortune 23
successful 24	(successful 24
(storm) 25	(storm) 25
(two) 26	(two) 26
(island) 27	(island) 27
(died) 28	(died) 28
(failed) 29	(failed) 29
(died) 30	(died) 30
(school) 31	(School) 31
(ten) 32	(10) 32
(dream) 33	(man) 33
(water) 34	(water 34

Figure 26. Key for completion test on "Enoch Arden." *Continued*

An old sea captain offered him an opportunity to sail on a ship bound for ——— *19* where he might gain great ——— *20*. Much against Annie's wishes, Enoch bought a small ——— *21* for her and set forth on the ship ——— *22* ——— *23*.

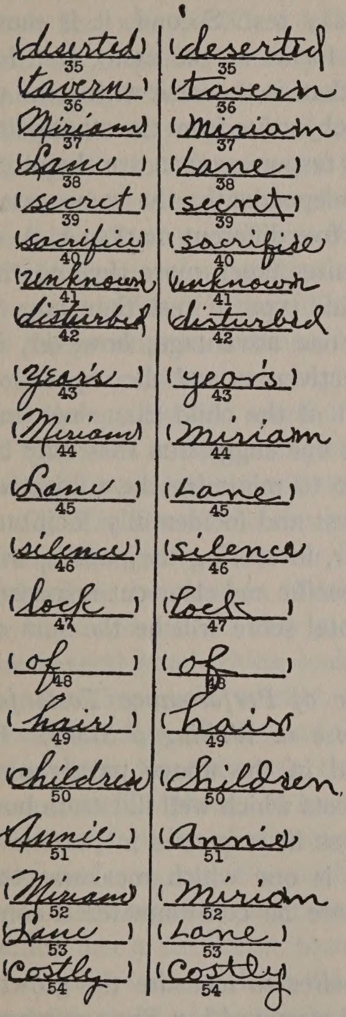
The outward voyage was ——— *24*. On the return a ——— *25* wrecked the ship, and Enoch and ——— *26* others were cast upon an ——— *27*. The others ——— *28* and Enoch was left alone.

In the meantime, Annie's business ——— *29*, her sickly baby ——— *30*, and the other children were in want. Philip came to offer to send the children to ——— *31*. After Enoch had been away for ——— *32* years, Philip finally persuaded Annie to marry him. She did not consent until a ——— *33* convinced her that Enoch was dead.

At last a ship wanting ——— *34* came upon Enoch's lonely island. Enoch succeeded in making himself understood, and the kind sailors took him home.

Figure 27. Specimen of a Narrative Completion Test on "Enoch Arden" for Junior High School Children. *Continued*

NARRATIVE COMPLETION TEST ON ENOCH ARDEN—*Continued*



(deserted) 35	(deserted 35
(tavern) 36	(tavern 36
(Miriam) 37	(Miriam 37
(Lane) 38	(Lane) 38
(secret) 39	(secret) 39
(sacrifice) 40	(sacrifise 40
(unknown) 41	(unknown 41
(disturbed 42	(disturbed 42
(Year's) 43	(year's) 43
(Miriam) 44	(Miriam 44
(Lane) 45	(Lane) 45
(silence) 46	(silence 46
(lock) 47	(lock) 47
(of) 48	(of) 48
(hair) 49	(hair 49
(children) 50	(children, 50
(Annie) 51	(Annie 51
(Miriam 52	(Miriam 52
(Lane) 53	(Lane) 53
(Costly) 54	(Costly 54

Figure 26. Key for completion test on "Enoch Arden." *Continued*

When he reached the village from which he had sailed so long before, he went slowly down the long street that wound through the little town to his old home, which he found ——— *35*. Turning, he went down to the narrow wharf in search of an old ——— *36* which he knew, and here he learned from ——— *37* ——— *38*, the tavern keeper, the story of his family. In ——— *39* he visited his family and learned how happy they were. He was almost happy in his ——— *40*, since he had determined to remain ——— *41* to the family lest their happiness be ——— *42*.

After a ——— *43* time, he became ill and realized that he was going to die. He called ——— *44* ——— *45* to him, charged her to ——— *46*, and told his story. To prove his identity to Annie, he sent her a ——— *47* ——— *48* ——— *49*, which she had given him when he went away. He asked that his ——— *50* be allowed to come to his funeral, but that ——— *51* should not come.

When he died, ——— *52* ——— *53* was only too glad to tell the story, and the funeral was very ——— *54*.

Figure 27. Specimen of a Narrative Completion Test on "Enoch Arden" for Junior High School Children. *Continued*

about the growth of children in twenty minutes than she can in two hours with the essay test. Second, it is more difficult to prepare equivalent forms of the essay test for measuring progressive growth than is the case with some of the other tests. Third, it is less objective from the standpoint of evaluating the quality of the responses than are the other tests. Five teachers scoring independently the same essay examination may easily give it five different marks, A, A—, B, B—, and C. Fourth, it requires much more time on the part of the teacher to score this type of test than any of the others mentioned. It has one advantage, however, in that it permits greater constructiveness and the expression of more originality on the part of the child than does any one of the other tests. There is one suggestion that may be offered as to how it is possible to minimize the subjective factor in scoring this kind of test and incidentally facilitate the scoring of it. If the teacher, in scoring the papers, will block off by pencil marks the specific and clear-cut responses which are correct, then, the total score will be the sum of all of the reactions so marked.

(2) Illustrations of the Use of Performance Tests for Measuring Changes in Response in Writing a Story. In addition to the tests described in the above paragraphs, there are certain performance tests which well illustrate how it is possible to measure changes in responses in purposive behavior. A performance test is one which measures the responses of an individual where he consummates a complete act within the test itself.

Suppose that the teacher desires to measure the growth of her children in the activity of story writing. She can measure this growth by measuring progressively the responses made by the children in this type of activity. Let us suppose that the children in her class have purposed to write for their first story, "What I Did on My Vacation." This is a unit of purposive activity and both the drive and the response aspects are measurable. At this point we shall consider how it is possible for the teacher to measure the changes in the responses of the children. Later in the chapter we shall return to the measurements of changes in drive in this unit of purposive activity. Changes in the responses of children in story-writing activities can be measured from the standpoint of three different phases, namely, the quality of the product as a composition, the mechanics of the composition (punctuation, capitalization, paragraphing, etc.), and the quality and speed of handwriting. How the changes in responses of boys and girls to these aspects of story writing may be measured will now be considered.

(a) The Use of the Freeman Handwriting Scale in Measuring Changes in Response in Story Writing. We may consider first the changes which take place in the handwriting of boys and girls as they prepare their written story. There are several handwriting scales for measuring the quality of handwriting on the market, among which are the Thorndike Scale, the Ayres Scale, and the Freeman Scale. For our purpose here we may use the Freeman Scale.[2] This scale measures five phases of handwriting, namely, uniformity of slant, uniformity of alignment, quality of line, letter formation and spacing. For each phase in the scale there are specimens representing three degrees of excellence, each of which has a particular score. The directions for using the scale will indicate how the teacher can score the quality and the speed of the handwriting of her children by the use

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[2] Freeman, F. N. Chart for Diagnosing Faults in Handwriting, 1914, and The Teaching of Handwriting, 1914. Houghton Mifflin Company.

of this scale with respect to five different phases mentioned above. The total score on the scale will be the sum of the scores on the five divisions.

The teacher can determine the growth of her children with respect to their handwriting responses in story writing by measuring the quality and speed of their writing the first of the year in "What I Did on My Vacation". Then at the end of the year another measurement can be made on their written report of "What I Saw at the Circus". The difference between the scores at the beginning of the year and those at the end will determine the extent to which the children have improved in responses in handwriting.

(b) The Use of the Driggs-Mayhew Composition Scales in Measuring Changes in Responses in Story Writing. Another phase of story writing which can be measured is the quality of the story from the standpoint of its composition. Several composition scales have been designed for measuring the quality of compositions, such as the Hillegas Scale, the Van Wagenen Scale, and the Driggs-Mayhew Scale. For the sake of illustration here we may use the Driggs-Mayhew Scale,[3] which is designed for use in the junior high school. For each of the grades VII, VIII, and IX, there are five qualities of composition and three specimens of each quality to be used as standards.

By use of this scale the teacher can measure early in the school year the responses in the written report of "What I Did on My Vacation". At the end of the year she can measure the responses in a second story, for example, "What I Saw at the Circus". The differences in the scores made on the first story and those made on the second will be the amount of improvement in story writing from the standpoint of the quality of composition.

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[3] Driggs, H. A. and Mayhew, A. F. Driggs-Mayhew National Scales for Measuring Compositions, 1917. The University Publishing Company.

(c) The Use of a Device for Measuring Changes in Responses in the Mechanics of Story Writing. It is more difficult to measure changes in responses in the mechanics of story writing than in either of the other phases. A number of scales have been designed to measure the child's ability to correct errors in punctuation, capitalization, paragraphing, etc., but they require that the child make his corrections in a set of sentences or in a composition prepared by some other individual. This does not constitute a unit of purposive behavior for the child. The unit child is not concerned with these corrections, consequently the results are not likely to be satisfactory.

The method to be suggested here is very long and laborious for the teacher, and for that reason she may not desire to use it frequently. However, it will secure the desired results if she cares to take the time to use it. Briefly, it is somewhat as follows. Let the boys and girls prepare the story which they have purposed to write, namely, "What I Did on My Vacation", mentioned above for an initial test. Then the teacher will analyze John's paper, for example, and determine the number of errors made in each of the mechanical aspects, such as punctuation, capitalization, and sentence structure. She will determine the relation between the number of correct usages of the comma, for example, and the total number of times the comma should have been used in John's story and express this relationship in terms of percentage. Suppose that John should have used the comma ninety times in his story but he used it correctly only seventy-two times. His score on the use of the comma would be eighty per cent. When all of the mechanical phases have been treated in this way, an average of the percentages will give John's initial score on this division of story writing.

At a later time in the year the children may write a story about "What I Saw at the Circus". This story will be treated in the same way. The difference between John's initial score and his final score will represent the improvement he has made during the year in his responses to the mechanical phases of story writing.

3. Means of Measuring Concomitant or Drive Changes in Purposive Behavior. As was stated in the beginning of the chapter, both the response changes and the drive changes in the activities of boys and girls should be measured. In the previous paragraphs we have made some suggestions to the teacher as to how she may measure the changes in response. We are now ready to consider the measurement of changes in drives. This factor in behavior is more difficult to measure than the drive, but since the teacher desires to secure improvement in the drives as well as in the responses of children she must find means of measuring it.

There are various devices by which the teacher may measure improvement in drives but the following seem to be the most satisfactory: the survey method, the performance test, and the multiple choice of stated attitudes. These will be taken up in order and illustrated.

(1) The Use of the Survey Method in Measuring Changes in Drive. The use of the survey method of measuring changes in the drives of boys and girls was illustrated in the experiment by Collings,[4] discussed in Chapter IX. It was desired to determine to what extent changes took place

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[4] Collings, E. An Experiment with a Project Curriculum, 1923.

in the drives of children in a rural school over a four-year period as a result of the introduction of certain new conditions of supervision and instruction. It will be recalled that surveys were made of changes in the attitudes of the children in the home and in the community with respect to certain activities in which children normally engage in the school, the home, and the community. This method was extended to measure even the changes in drives of parents over the four-year period as a result of introducing the new conditions of educating the children.

Methods similar to those used in this experiment can be used to measure changes in drives in the children in relation to their study of health problems, problems in ethics, problems of citizenship, problems of recreation, and in the study of literature, science, music, art, skills, and many other activities in which boys and girls engage. The differences in the results of the initial survey and final surveys will reveal the extent to which the drives of the children have been modified as a result of the condition of their behavior in school.

(2) The Use of Performance Tests in Measuring Changes in Drive in Story Writing. Much of what was said above concerning the use of performance tests in measuring changes in responses can be said for their use in measuring changes in drives. For example, consider the use of the same tests mentioned in that connection, namely, the composition test, the test for the mechanics of composition, and the handwriting test. Suppose that the teacher desires to determine to what extent the work in the school is carrying over and modifying the drive for story writing. In measuring changes in responses discussed above, she selected an activity along the line of communication in which all of the

children were engaged and in which each child was expected to be concerned with the quality of the composition, the mechanics of preparing it, and the neatness and legibility of the handwriting. Whatever changes took place in story writing under these conditions were in the responses which were made, since that was the phase of behavior that was being emphasized. But, what about the changes in drive for carrying on this kind of activity? What can be ascertained about the attitudes of the children with respect to the quality, mechanics, and handwriting involved in written communication in other activities where the emphasis is not placed upon these items?

The teacher can measure changes in drive in these respects by using these tests from time to time to measure improvement in these qualities in written reports of other lines of activity in which the children engage, as excursion activities, play activities, skill activities, etc. The difference in the score on an initial composition test and a final composition test for example, will indicate the degree to which the drives for this phase of activity have been changed. The extent to which a child undertakes to prepare a neat and adequate composition in a situation where this is not the principal goal but simply because he purposes to do so on his own accord, indicates the extent to which its drive for this phase of behavior has been conditioned.

(3) Illustrations of the Use of the Multiple Choice Test in Measuring Changes in Drive. The multiple choice test also may be used in measuring changes in drive. The teacher may prepare a list of stated attitudes to each of which there is a multiple of responses from which the child can select the responses it desires to make. This test can be applied to the study of problems in health, ethics, public opinion, etc. Or

the teacher herself may, in some instances, desire to score the pupils on how they appear to be responding with respect to these attitudes. The changes in scores which she observes from time to time will indicate the extent to which the drives of her children are being conditioned. A few forms of this type will now be illustrated.

(a) The Use of the Chassell-Upton Citizenship Scale in Measuring Changes in Drive. The Chassell-Upton Citizenship Scales[5] are good examples of how the teacher may measure changes in drive. They are a modification of the multiple choice test, the main difference being that the teacher makes the judgment as to how she thinks the children are exhibiting their conditioned drives, rather than having the children use the tests. They represent a good cross section of the attitudes or conditioned drives of children who are expected to be good citizens in a school community. This type of conditioned drive is highly important, since, as it was shown in Chapter VI, the individual must live in and react to a social environment, not only during childhood but throughout adulthood. Therefore the teacher should be interested in how to measure conditioned drives of this kind. The scales in question provide a basis for such measurement and are suggestive as to other steps that might be taken in this direction.

In Figure 28 is shown a sample of one of the Chassell-Upton Scales. There are twenty-four items in each scale and these items are separated into three groups by horizontal lines. The first group contains five attitudes of least importance; the second group the eleven attitudes of next

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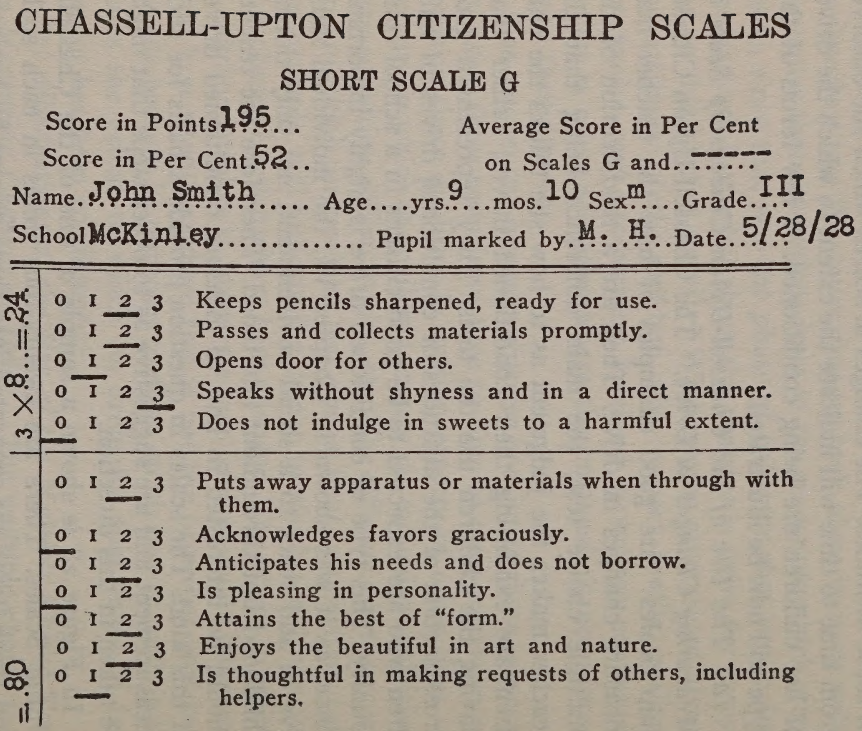
[5] Chassell, C. F., Upton, S. M., and Chassell, L. M. Chassell-Upton Citizenship Scales. Described in "Short Scales for Measuring Habits of Good Citizenship," Teachers College Record, 1922, 23, 52-79. By permission of Bureau of Publications, Teachers College, Columbia University.



CHASSELL-UPTON CITIZENSHIP SCALES

SHORT SCALE G

Score in Points 195... Average Score in Per Cent
Score in Per Cent 52.. on Scales G and ------
Name John Smith..... Age....yrs 9...mos. 10 Sex m....Grade III
School McKinley............ Pupil marked by M. H. Date 5/28/28

3 × 8 .. = 24

0	1	[✓ 2]	3	Keeps pencils sharpened, ready for use.
0	1	[✓ 2]	3	Passes and collects materials promptly.
0	[✓ 1]	2	3	Opens door for others.
0	1	2	[✓ 3]	Speaks without shyness and in a direct manner.
[✓ 0]	1	2	3	Does not indulge in sweets to a harmful extent.
0	1	[✓ 2]	3	Puts away apparatus or materials when through with them.
[✓ 0]	1	2	3	Acknowledges favors graciously.
0	1	[✓ 2]	3	Anticipates his needs and does not borrow.
[✓ 0]	1	2	3	Is pleasing in personality.
0	1	[✓ 2]	3	Attains the best of "form."
0	1	[✓ 2]	3	Enjoys the beautiful in art and nature.
0	[✓ 1]	2	3	Is thoughtful in making requests of others, including helpers.

= .80

5 × 16. =

0 [✓ 1] 2 3 Gives praise where praise is merited.
0 1 [✓ 2] 3 Plans his daily program so that there may be healthful balance between work and outdoor activities.
0 1 2 [✓ 3] Takes care not to promise more than he can fulfill.
0 [✓ 1] 2 3 Gives proper criticism in a courteous manner, and accepts suggestions from others and profits by them.

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7 × 13. = .91

[✓ 0] 1 2 3 Sees details in their relation to the whole and selects essential points.
0 1 2 [✓ 3] Tries to do his best even when the task is disagreeable or praise is not forthcoming.
0 [✓ 1] 2 3 Seeks intelligently opportunities for serving others.
0 1 2 [✓ 3] Has faith in others.
0 1 [✓ 2] 3 Does not indulge in injurious or debasing practices.
0 1 [✓ 2] 3 Faces facts squarely and does not allow himself to be misled by prejudices.
0 [✓ 1] 2 3 Considers candidates from the standpoint of the qualities essential for leadership, and elects a person for no other reason than his fitness for the position.
0 [✓ 1] 2 3 Supports the right and opposes the wrong whenever occasion arises.

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These short scales provide a quantitative measure of the progress of pupils in forming habits and attitudes of good citizenship. For full directions for using and scoring them, see the *Teachers College Record* for January, 1922.

Figure 28.—A Specimen of the Chassell-Upton Citizenship Scales which has been filled out according to directions in measuring the attitudes of John Smith.

greater importance; and the third group the eight attitudes of highest importance. The directions for administering the scale, scoring, and treating the results, are given in the article referred to and they are reproduced here with slight adaptations so as to fit them to specimen Scale G in Figure 28 rather than to specimen Scale A used in the article.

Directions for Marking the Scales. The numbers 0, 1, 2, 3, appearing in the columns at the left of each item on the scale are to be interpreted as follows:

0 indicates almost complete absence of the habit or attitude in question;
1 indicates below average attainment;
2 indicates above average attainment;
3 indicates practically perfect attainment.

In the case of each item underline the number which represents the child's present degree of attainment in the given habit or attitude. After marking the twenty-four items in this way, proceed further as follows:

(1) Add the underlined numbers opposite the first five items (separated from the remainder of the scale by a black line extending across the page), and enter this sum in the space provided after multiplier 3 in the margin at the left. Perform the multiplication indicated, and enter the results in the space provided.

In the specimen marking of Scale G, the sum of the five underlined items in the first part is 8, which is to be multiplied by 3, thus giving 24, as the score on the first part of Scale G.

(2) Add the underlined numbers opposite the eleven items in the second part of the scale, enter this sum in the space after the multiplier 5, perform the multiplication indicated, and enter the result.

In the specimen marking of Scale G, the sum of the eleven underlined items in the second part is 16, which is to be multiplied by 5, thus giving 80 as the score on the second part of Scale G.

(3) Add the underlined numbers opposite the eight items in the third part of the scale, enter this sum in the space after the multiplier 7, perform the multiplication indicated, and enter the result.

In the specimen marking of Scale G the sum of the eight underlined items in the third part is 13, which is to be multiplied by 7, thus giving 91 as the score on the third part of Scale G.

(4) Add the score on the three parts of the scale, and enter the total score at the top of the page, after the words Score in Points. The maximum score, possible only in case an individual should be considered of sufficiently perfect attainment for a credit of 3 to be assigned to each item, is 378 points.

In the specimen marking of Scale G the addition of 91 + 80 + 24 gives 195 as the total score, or the score in points.

(5) By reference to the table on p. 72 (of the article referred to) find the value of this score in points expressed as a per cent of 378 (the maximum score possible), and enter this figure after the word Score in Per Cent, in the space provided at the top of the page.

According to the table the total score of 195 on Scale G is equal to 52 per cent of 378, the maximum score possible. Thus 52 is entered as the score in per cent.

At the beginning of the school year the teacher can administer one of the forms of this citizenship scale, say Scale A. At subsequent periods during the year she can administer other forms. The differences between the percentage scores of the initial Scale A and the scores on subsequent scales will represent the progressive changes in drive which the children undergo, as a result of the various school conditions which have been effective during the time.

(b) The Use of the Watson Public Opinion Test in Measuring Changes in Drive. Another form of the multiple choice test which can be used for the purpose under consideration is that by Watson.[6] This test is designed for the purpose of measuring attitudes on some religious and economic issues, under such headings as Degree of Truth Test, Inference Tests, Moral Judgment Test, Arguments Tests, and Generalization Tests.

We may illustrate the use of this test if we take a sample from the Moral Judgment Test, as follows:

"DIRECTIONS: Most actual judgments of right and wrong have to be made in concrete instances. Mere general principles are not enough.

"In the following pages you will find several instances upon which the moral judgment of individuals would differ. Read each carefully. You may assume each fact as stated. Then look at the alternatives suggested below it. Place a check in front of the one with which you most fully agree. If you do not fully agree with any, check the one which comes nearest to expressing your opinion about the incident.

"EXAMPLE: A man stumbled into his house, drunk with bootleg whisky. He smashed up some of the furniture and beat his wife and children. Then he stole some money from his small son's bank in order to buy more whisky.

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[6] Watson, G. B. A Survey of Public Opinion on Some Religious and Economic Issues: The Watson Test, 1927. By permission of Teachers College Bureau of Publications, Columbia University.

"☐ His action is worthy of approval.

"☐ The people who tolerated the sale of bootleg whisky were in some degree responsible.

"☐ The occurrence is worthy neither of approval nor disapproval. It is quite indifferent.

"☑ It would be desirable to prevent such a thing happening again, if possible, by establishing a better type of character in the man himself."

The Watson test, like the Chassell-Upton Scale, may be used to measure changes in drive. The test may be administered at the beginning of a course in social science and repeated at the end of the course. The differences in the score will represent the degree of changes in drives with respect to the particular situations involved.

4. **Summary.** In addition to the usual criteria for designing measures of behavior, namely, usability, validity, reliability, and objectivity, a good measuring device should meet the following conditions which frequently are neglected: (1) Measure changes in purposive behavior and not merely the perfection of end-results; (2) Measure changes in terms of units of purposive behavior and not in terms of detached responses; and (3) Measure changes in both the drive and the response in purposive behavior.

There are various ways by which the primary changes or changes in responses can be measured, such as the true-false test, the multiple choice test, the completion test, the essay test, the performance test, or a battery of tests composed of two or more of these individual tests. The difference between the score made on one of these forms as an initial test and an equivalent form of the same test as a final test represents the growth of the child in the particular activity in question.

As examples of the use of performance tests in measuring changes in responses of children, we have, first, the handwriting scales. There are several scales of this kind, such as the Thorndike Scale, the Ayres Scale, and the Freeman Scale. Second, there are the composition scales which can be used for measuring changes in responses in story writing. Among these are the Hillegas Scale, the Van Wagenen Scale, and the Driggs-Mayhew Scale. Third, it is possible for the teacher to devise means by which she can measure the performance of children with respect to such activities as are involved in the mechanics of story writing, for example, punctuation, capitalization, and paragraphing.

The changes in drive in child behavior may be measured in various ways, such as the use of the survey, the completion test, and the multiple choice test. A good example of how the multiple choice test can be used is that designed by certain investigators to measure attitudes in social science studies.

CHAPTER XXIV

MEASUREMENT OF CHANGES IN PURPOSIVE BEHAVIOR: INDIVIDUAL DIFFERENCES

1. Variability in Life. *(1) The General Concept of Variability.* As we look at the various creations in nature about us we are struck with the fact that the principle of variability runs through all of them. The amount of rainfall varies from day to day, month to month, and year to year. The same is true of temperature; it is seldom that the temperature on August first is the same as it was on the same day the preceding year. The amount and quality of field crops produced varies widely from one year to another. The number of horses, mules, and cattle shipped to market during a given year are seldom the same as that shipped during any other year. These illustrations could be multiplied without end and we would still find that the element of variation was ever present.

When we consider human beings we find the presence of the same principle. No two individuals are exactly alike with respect to any feature or trait. If we consider the physical traits of people, we find a wide range of variation in each trait. Complexion ranges from the extremely dark color of the Ethiopian to the pale face of the Caucasian. The ranges of weight and height seen at the circus when we compare the weight and stature of the little Tom Thumb with those of the giant are examples. A like variation will be found to be true but to a less degree with respect to color of hair and eyes.

The particular phase of variability with which the teacher is concerned is involved in the differences in individuals with respect to their abilities and interests. Few children are exactly alike in their capacities for solving problems in the ordinary activities in which they engage. Likewise it is seldom that two children can be found who have exactly the same interests or drives. How to meet the needs of a group of children with heterogeneous interests and abilities constitutes one of the most important problems in education from the Commissioner of Education at Washington to the teacher in the one-room rural school. More will be said of the importance of this problem later in the present chapter. We may find it profitable at this point to illustrate how individuals differ in certain respects.

(2) Illustrations of Human Variability. As an illustration of variability in a human physical trait, we may take the heights of men born in Great Britain.[1] These individuals were born in England, Scotland, Wales, and Ireland. The distribution of their heights is given in Table XII.

The range of heights in this group of men is from 57 to 77 inches. In other words the tallest men are almost two feet taller than the shortest men. The average height is approximately 67 inches. Despite the fact that all of these men were born within a few hundred miles of each other, under much the same climatic conditions, and under many other conditions which were very similar, we have this wide deviation from a central tendency or average.

Variability of the intelligence of individuals can be illus-

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[1] Rugg, H. O. Statistical Methods Applied to Education, 1917, p. 231. By permission of Houghton Mifflin Co.

TABLE XII

DISTRIBUTION OF STATURE OF MEN BORN IN GREAT BRITAIN

Height (inches)	*Number of Men*	*Height (inches)*	*Number of Men*	*Height (inches)*	*Number of Men*
57	2	64	669	71	392
58	4	65	990	72	202
59	14	66	1223	73	79
60	41	67	1329	74	32
61	83	68	1230	75	16
62	169	69	1063	76	5
63	394	70	646	77	2
Total					8585

trated by the scores made on an intelligence test. The Otis Advanced Intelligence Scale was administered to a group of students in the University of Oklahoma. The scores made on this test were expressed as an Index of Brightness according to a formula given in the *Manual of Instructions* which accompanies this test. The distribution of these Indices of Brightness is shown in Table XIII.

A large majority of these students were born and reared in Oklahoma and attended the public schools of this state, yet we notice a wide range of differences in intelligence

TABLE XIII

DISTRIBUTION OF INDICES OF BRIGHTNESS OF STUDENTS IN THE UNIVERSITY OF OKLAHOMA, USING THE OTIS ADVANCED INTELLIGENCE SCALE

Index of Brightness	*Frequency*	*Index of Brightness*	*Frequency*	*Index of Brightness*	*Frequency*
190-199	1	130-139	257	70- 79	21
180-189	6	120-129	241	60- 69	11
170-179	45	110-119	193	50- 59	5
160-169	115	100-109	152	49- 49	1
150-159	213	90- 99	78	30- 39	1
150-149	243	80- 89	44		
Total					1627

measured by the Otis measuring device. The Indices of Brightness range from 39 to 194 with an average of approximately 131.

Another example of how individuals differ in ability is shown in a study of the promotion rate of children in any school system. Take all of the children of any given age, say eleven years, and determine where they are located throughout the school. It will be found that one or more of them will be present in every grade below the high school. The data taken from a study by Kelley,[2] shown in Table XIV, will illustrate the point in question. The ages of these children range from 11.50 to 12.00 years. Of the 1349 children included in this study, a large number were found in the fifth and sixth grades. However, there were some children of this age who were enrolled in the first grade, others in the eighth grade, and still other children in the intervening grades.

An examination of these three tables will readily reveal the fact that the student of human behavior must not expect to be able to prepare a set program which will fit every individual. Human beings differ with respect to their physical traits, and their abilities, and their interests. This fact must be recognized by the teacher as she prepares her educational program. These differences will be revealed by a program of measuring child growth discussed in the previous chapters of this section.

(3) The Use of the Frequency Polygon and the Normal Probability Curve in the Study of Variability. One very convenient device for representing variability of individuals with respect to a given trait or activity is the frequency polygon. This device shows in a graphical form the range

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[2] Kelley, T. L. The Influence of Nurture upon Native Differences, p. 40, 1926. By permission of The Macmillan Co.

TABLE XIV

DISTRIBUTION OF 11.50-12.00-YEAR-OLD CHILDREN IN THE SAN JOSE, CALIFORNIA, SCHOOL SYSTEM OVER A PERIOD OF YEARS. (After Kelley.)

Grades in which found age 11.50-12.00	Low 1	High 1	Low 2	High 2	Low 3	High 3	Low 4	High 4	Low 5	High 5	Low 6	High 6	Low 7	High 7	Low 8	
No. found	1	14	17	47	70	87	101	138	201	220	212	150	63	25	3	1349
Per cent of 11-yr.-olds regularly promoted..	0	0	6	6	6	11	12	8	8	5	6	5	6	4	0	

and limits of variability and also the number of individuals measured who fall at any given level along the scale of values determined. We may illustrate the use of the frequency polygon if we apply it to any one of the set of data used in previous paragraphs, say the heights of men in Great Britain shown in Table XII.

In plotting the curve for the distribution of this trait, first draw two axes at right angles to each other, calling the base line the x-axis and the vertical line the y-axis. On the x-axis lay off a scale of values of convenient class intervals, for example, in intervals of one inch, which will include the range of data given, or 57 to 77 in this case. On the y-axis lay off another scale which will include the range of frequencies found for each one of the class intervals. A glance at the table shows that the greatest frequency is 1329 and the lowest is 2. Hence the scale of frequencies must range from 2 to 1329 and this range may be divided for convenience into class intervals of 100.

After these details have been taken care of, the polygon can be plotted as follows: Begin, say, with the lowest class interval of height given in the table which is 57 inches. The corresponding frequency for this height is 2. Locate the point $(x = 57, y = 2)$ by placing a small dot at the proper place. Do the same for each of the other points represented in the table. Connect these points, finally, by broken straight lines. The result is the desired frequency polygon which is shown in Figure 29.

In studying variability it is impossible to measure all individuals in the world with respect to any trait and activity. Consequently, we are led to seek a law of variability which may be expected to apply to a limited group of individuals as well as to an ideal total population. After studying this problem for some time and after measuring many individuals with respect to multitudes of traits this law was discovered more than a century ago. It was found that the curve representing the distribution of all measurable traits closely approximates that obtained by plotting the coefficients of the separate terms in the binomial expansion, for example, $(\frac{1}{2} + \frac{1}{2})^{12}$. This curve is known as the normal probability curve.

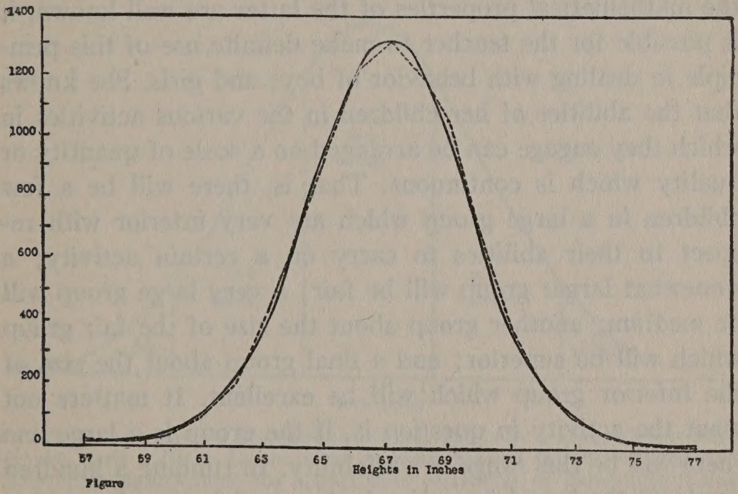

FIGURE 29.—Frequency Distribution of the Stature of Men Born in Great Britain, to which is fitted a Normal Probability Curve. The Normal Curve is Represented by the Solid Line and the Frequency Curve by the Broken Line.

We may illustrate how closely the distribution of a given trait for a large number of individuals approximates the normal probability curve if we fit a normal curve to the curve representing the heights of men born in Great Britain. This curve is superimposed upon the curve of the observed data in Figure 29 and is represented by the solid line. This is one of the best examples of how closely the distribution curve of a human trait will approximate the normal probability curve when the trait in question is measured in a sufficiently large number of individuals.

Since the principle underlying the distribution of human traits is the same as that of a chance distribution, and since the mathematical properties of the latter are well known, it is possible for the teacher to make definite use of this principle in dealing with behavior of boys and girls. She knows that the abilities of her children in the various activities in which they engage can be arranged on a scale of quantity or quality which is continuous. That is, there will be a few children in a large group which are very inferior with respect to their abilities to carry on a certain activity; a somewhat larger group will be fair; a very large group will be medium; another group about the size of the fair group which will be superior; and a final group about the size of the inferior group which will be excellent. It matters not what the activity in question is, if the group is a large one there will be this range of variability. In running a hundred yards, in the broad jump, in singing, in debating, in making a bookcase, in making a cooking apron, in making fudge, in dramatizing "Enoch Arden," in any activity in which the group of children is large and unselected, she will find this scale of variability in number and quality of responses made. For illustration, the x-axis of the normal curve in Figure 30 is divided into five parts which will correspond to the five categories of quality mentioned above and the percentages of individuals who would fall within a given category are given above in the area under the curve.

2. Three Fundamental Sources of Individual Differences. There are three fundamental sources of individual differences, namely, inheritance, environment, and maturity.[3] Some writers add to these three a fourth source of variability, namely, sex. However, in so far as the purpose of the present writing is concerned, it is believed that whatever differences the teacher may discover in the interests and abilities of boys and girls can be accounted for to a large extent by the influences of heredity and environment. A pair of twins, a boy and a girl may differ in their interests but this is largely due to the differences in the environment influencing the two children. The girl is much more sheltered and protected in the home and the community than is the boy. Likewise there is a great difference in the kinds of activities in which the two children engage. The boy usually becomes well acquainted with the work of the father and his

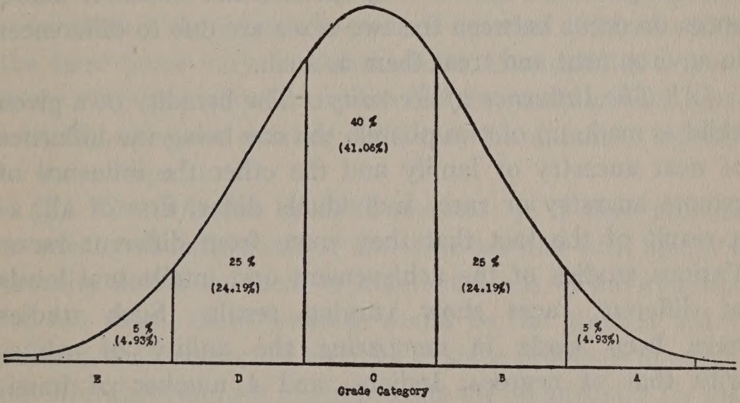

FIGURE 30.—Percentage Distribution of Individuals in a Large Group Who Should Merit a Given Grade if the Marking System Has Five Categories. (The upper figures show the approximate percentage of individuals falling within a given class, the exact percentages being enclosed within the parentheses.)

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[3] Twenty-seventh Yearbook of the National Society for the Study of Education, Parts I and II. 1928.

associates. The girl develops an interest usually in the things that her mother is doing. The results of various kinds of measurements of children's activities reveal some differences between the sexes, but in so far as general ability is concerned in activities where physical strength is not involved the one sex is the equal of the other. Therefore, for all practical purposes the teacher may assume that whatever differences do occur between the two sexes are due to differences in environment and treat them as such.

(1) The Influence of Heredity. The heredity of a given child is made up of two phases, the one being the influence of near ancestry or family and the other the influence of remote ancestry or race. Individuals differ, first of all, as a result of the fact that they come from different races. Various studies of the achievement and intellectual levels of different races show varying results. Such studies have been made in comparing the ability of whites with that of negroes, Indians, and a number of immigrants from foreign countries. The results of these studies show that there is considerable variation in these respects as we go from one race to another. However, there is one factor which tends to minimize the effect of heredity and increase correspondingly the effect of environment. That is, practically all of these studies have been made in terms of responses to purely American-made situations. The tests used frequently require the ability to read and interpret English. The individual taking the test is required to think in terms of American concepts and ideals. Likewise the tests frequently presuppose training in American schools. Hence, it may be necessary to discount to a considerable extent the differences existing between races as revealed in experimental and statistical studies.

In the second place, individuals differ as a result of the fact they are the offspring of different families within the same race. A child of low ability may come from a given home, whereas, in a home in the same block may be found a child of very superior ability. The one child may succeed finally after a series of failures to complete only the second grade. The other may complete a college education. In this connection it should also be pointed out that children within the same home vary in their abilities. One child in a given home may be highly successful morally, socially, and intellectually, whereas another child may be a failure in each of these respects.

(2) The Influence of Environment. If it were possible to select two individuals of the same sex and with identical heredity and keep them in different kinds of environment for ten years, there possibly would be the greatest differences in their respective abilities to solve problems in everyday life. Environment might provide the opportunity for one to receive a good education and thereby be able to cope with the most difficult problems of community, state, and nation. The environment of the other might so cramp and restrict his development that his behavior would approach only that of primitive man. Heredity provides the individual with the ability to respond, but it is the environment which contributes most to the development of this ability. In a restricted environment the boy may develop into a ditch digger. But in an environment where opportunities are practically unlimited he may become an engineer and direct the construction of irrigation and drainage ditches, the construction of dams and reservoirs to control flood waters, or the construction of a Panama Canal.

(3) The Influence of Maturity. In certain respects maturity is closely related to environment. Maturity determines the length of the time during which the environment factors are effective. In this connection, Thorndike [4] makes the following statement: "No competent student doubts that in certain mental traits maturity or inner mental growth causes one individual to differ year by year from his former self, irrespective of all training. The same forces necessarily account for some of the differences found between children of different degree of mental maturity. If by a miracle a hundred children could be found who were alike in sex, ancestry and training, but who were divided into two groups by a difference in the extent to which the original impetus to mental development had run its course, the groups would differ, in at least certain traits, in accordance with this difference in stage of growth or maturity."

Everything else being equal, it is differences in maturity which cause one child to score 195 on the Chassell-Upton Citizenship Scale, and 80 on the true-false test on Enoch Arden, and 56 on the mechanics of composition in writing a story about "What I Did on My Vacation", and another child to score 250, 92, and 65 on the same tests. Other factors being equal, it is differences in maturity which account for the fact John can make a better bookcase, write a better story, and play a better game of tennis when he is fourteen years of age than when he was only eight.

3. **Individuals Differ in Drives and Responses.** Throughout all of the discussions leading up to the present chapter emphasis was placed on the fact that there are two phases of behavior in which the teacher is particularly

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[4] Thorndike, E. L. Educational Psychology, Briefer Course, p. 369, 1914. By permission of the author.

interested, namely, the drive and the response. It was pointed out frequently that the teacher, in order to secure the most satisfactory results in directing the growth of boys and girls, must emphasize both of these phases. When the various measuring devices discussed in the previous chapters are applied to the behavior of boys and girls it will be found that children differ in both their drives and their responses.

(1) Illustrations of How Individuals Differ in Drives. Whatever may be the cause of variability in behavior the teacher will find when the children are placed under her care they vary greatly in the drive aspect of their behavior, such as may be expressed by such terms as interests, ideals, as well as in their more immediate goals, such as the kinds of communicative, constructive, play, or skill activities in which they may desire to participate. A few illustrations will make clear the point in question.

A class of thirty junior high school children were asked to indicate the vocation, trade, or profession each wished to pursue when maturity was reached. The results were as follows: teacher, 4; minister, 1; farmer, 2; merchant, 3; circus manager, 1; actor or actress, 3; esthetic dancer, 1; musician, 2; artist, 1; housewife, 3; railway conductor, 2; locomotive engineer, 2; mechanical engineer, 1; and electrical engineer, 3. If the class had been larger the range of vocations would have been greater.

Cartwright [5] made a study of the reading interests of the junior High School children of the University of Oklahoma. She found that when children are given access to a large number of books on fiction, history, biography, everyday science, travel, etc., the range of their choice is almost unlimited. By combining her results with those of other studies, Mrs. Cartwright found that literally hundreds of different titles will be selected by a large group of children.

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[5] Cartwright, S. O. A Proposed List of Outside Reading Books for the Junior High School, 1926. (Master's Thesis, The University of Oklahoma.)

If we examine the range of goals initiated by children in the various lines of purposive activity discussed in Chapter XIII, we will find that the interests of children vary greatly with respect to different kinds of things they like to do. In an excursion activity, various members of a class will purpose to study industries, occupations, civic activities, plant life, animal life, and the earth and sky. Each one of these subdivisions of the excursion activity may be represented in the goals initiated by a class of twenty-five or thirty girls and boys. In the story activity, different children may purpose to read or tell a story, dramatize a story, or interpret a story in song or in picture. When we come to the hand activity, even a wider range of interests may be expressed. In this line of activity the children may purpose to do constructive work in wood, paper, textiles, metal, raffia, rope, clay, paint, water colors, crayola, yarn, rags, leather, cardboard, reed, foods, mechanics and electricity. For the play activity, there are several groups of goals which may be set up. Among these are indoor games, such as indoor baseball; outdoor games, as tennis; indoor contests, such as debating and typewriting; and outdoor contests as football, baseball, and track events. In the skill activity there are almost unlimited choices which the children may make as to the particular activities in which they may wish to participate, such as learning to play the piano, operate a typewriter, etc.

Children differ not only in their drives for different kinds of activity but they differ in the extent to which these drives can be modified. One child may exhibit a low quality of drives but through the stimulation and direction of the teacher he may develop a high quality of purposefulness. On the other hand, a child with the same low level of drive may never improve to any great extent in this respect. For example, in the Junior High School of the University of Oklahoma there were two students A and B who came from an environment where culture and refinement were lacking. When the class in which they were enrolled desired to work out an activity in reading, these two students invariably purposed to read a story of a very low grade. If the activity was of the dramatization type they could initiate nothing above the level of the comic strip in the Sunday paper. But the teacher went to work to improve these two students along with many others with respect to the choice of their literature. Within a year or so A had cultivated good taste in the selection of what he read; he had come to appreciate the better writers and their productions. But at the end of this period B was still mainly interested in reading material of inferior quality.

(2) Illustrations of How Individuals Differ in Responses. As it is with the drives of children, so it is with the responses that they make; they show the widest variations. The teacher is interested, as has been shown in previous discussions, in the extent to which responses can be conditioned or changed. As was pointed out in the previous chapter, one of the fundamental principles in the construction and use of an educational measuring device is that it measures changes in behavior and not merely the perfection of behavior at any given time. So the teacher should be concerned with how and to what extent her children differ in the changes in their behavior that she can bring about.

A few illustrations will make clear the extent to which

TABLE XV

JUNE SCORES OF A FIFTH GRADE CLASS IN READING (From Brooks[6])

Pupil Number	*Score in Rate*	*Score in Comprehension*
1	108	26
2	98	20
3	73	14
4	85	19
5	101	25
6	95	21
7	50	8
8	105	20
Average	89.4	19.1

children differ in the changes that can be brought about in responses along certain lines. Table XV shows the results when a group of children were measured at the end of the school year with respect to their rate of reading and understanding what was read. Although no initial test for these children was given it may be assumed, roughly, that each child had the same opportunity to improve its ability in reading. But the results of the measurement show that the most rapid reader could read more than twice as rapidly as could the poorest. For comprehension of what was read they show that the best reader comprehended more than three times that comprehended by the poorest reader.

In the University High School a group of children, under the direction and stimulation of the teacher, purposed to improve their responses in certain skilled activities, namely, the use of the mechanics of English. During an initial twelve-week period a record was kept of all of the errors made in such responses as capitalization, punctuation, construction of sentences, paragraphing, etc. This was used as a basis for a study of improvement made by the class during the next twelve-week period. Table XVI shows how the children varied with respect to their improvement in sentence structure, for example. The range of improvement for this group was from 11% to 75%. The one student improved almost seven times as much as the other.

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[6] Brooks, S. S. Improving Schools by Standardized Tests, p. 75, 1922. By permission of Houghton Mifflin Co.

TABLE XVI

INDIVIDUAL DIFFERENCES OF CHILDREN IN IMPROVEMENT IN SENTENCE STRUCTURE (From Chaney [7])

Name of Pupil	*Percentage of Improvement*
Everette	65
Willie	50
Mary	73
Nellie	33
Alta	44
Edna	47
Virginia	36
Amelia	58
Davie Jane	11
Frankie Lee	63

Another study conducted in The University of Oklahoma Training School, the primary purpose of which was to determine the relative effectiveness of the assignment and the purposive activity methods of teaching, revealed the extent to which children vary in their ability to improve in a given activity. As an example, Table XVII shows the variability of improvements in ability to punctuate sentences. The range of improvement in this activity for this particular group was from 6 to 32 points. In other words the student making the most improvement accomplished in this respect more than five times as much as the poorest student.

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[7] Chaney, N. P. An Investigation in the Skill Needs of Children, 1927. (Master's Thesis, The University of Oklahoma.)

TABLE XVII

INDIVIDUAL DIFFERENCES OF CHILDREN IN IMPROVEMENT IN PUNCTUATION (From Hodges[8])

Case Number	*Improvement*
1	24
2	..
3	25
4	23
5	6
6	22
7	32
8	7
9	25
10	17
11	29
12	18
13	24
14	14
15	17
16	20
17	17
18	27
19	15

4. How Heredity, Environment, and Maturity Affect Drive. From the standpoint of heredity, the child has at birth no specialized drives other than the gross physiological drives discussed in Chapter VI. And since the latter are very much the same in all individuals, we may assume for all practical purposes that children at birth do not differ with respect to their potential drives. By this statement it is not implied that one child is the same as every other child in general ability. It is certainly true that child A may have the general ability to make Phi Beta Kappa and become highly successful in business, whereas child B may be utterly lacking in the ability to complete even the elementary education and to succeed in even the most simple kind of occupation. But the point to be made here is that for a given child there is an inheritance of no particular drive to be a musician, sculptor, painter, engineer, statesman, minister, physician, or teacher.

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[8] Hodges, M. A Comparative Study of the Assignment and Project Methods of Teaching, 1928. (Master's Thesis, The University of Oklahoma.)

It is through the influence of environment that specialized drives are developed. The child in the home of the noted musician is likely to become interested in music, because it is stimulated more often and more vigorously along this line than any other. Likewise the boy who is born into the home of a noted physician, engineer, or statesman, is likely to develop an interest along the line of the vocational interests of his father.

This question is in dispute at the present time. Mrs. Hollingworth [9] holds that children do inherit specialized talents and defects. On the other hand, Watson [10] opposes this view and states that all specialization observed in the behavior of children is a product of environment. ". . . There is no such thing as an inheritance of capacity, talent, temperament, mental constitution and characteristics." The problem needs further investigation and study from a scientific standpoint. One of the writers [11] has made some study of the problem from the standpoint of achievement of students in a college of arts and sciences. The results tend to show that ability to succeed in college work is general rather than specific. In other words, the student who is superior in one phase of college work tends to be superior in all other phases. This point is illustrated in Figure 31. The same writer [12] has also studied the results of investigations along various lines which bear upon this problem and has found that they bear out the same general conclusion, namely, that ability is general rather than specific. First of all, the studies of the neurologist as a general rule do not appear to reveal any neural basis for inherited specialization. Second, the statistical studies along the line of achievement, similar to the one referred to above, rather reveal the fact that ability is generalized. Third, the results of the studies of specially talented or specially defective children reveal that in a large number of cases the individual unevenness is traceable to environmental causes. Hence as was stated above, it may be

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[9] Hollingworth, L. S. Special Talents and Defects, 1923.

[10] Watson, J. B. Behaviorism. Lectures on "Are There Any Instincts?" 1925. By permission of W. W. Norton and Co.

[11] Wilson, M. O. "Interests of College Students." Amer. J. Psychol., 1927, 38, 409-417.

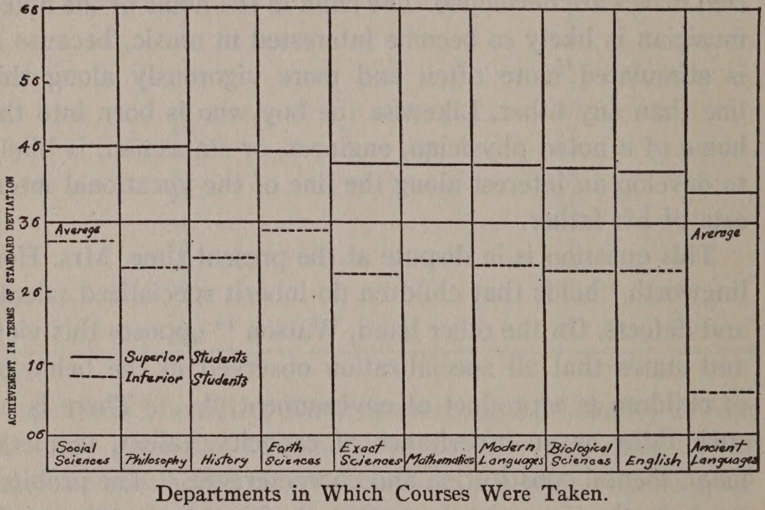

FIGURE 31.—Relative Achievement of Exceptional Exact Science Students, showing a tendency toward general superiority or inferiority rather than Specific Superiority or Inferiority.

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[12] Wilson, M. O. "The Intelligence of the School Child With Uneven Abilities." University of Oklahoma Bulletin: Proceedings of the Oklahoma Academy of Science, 1928, 8, 168-176.

assumed for all practical purposes at least that the child inherits no specialized drives. It may inherit a general ability of high, low, or mediocre quality, but all specialization in connection with drives along any particular line of activity is the result of environmental influences.

Maturity is the factor which makes possible the effect of environment over a period of time. If the father is attempting to develop in his young son a drive for activities along the line of engineering, time is required to bring about the desired result. Other things being equal, the drive will be strengthened somewhat in proportion to the time during which the influences of the environment prevail. This is certainly true up to a certain limit at least.

5. How Heredity, Environment, and Maturity Affect Responses. Heredity affects the limits of improvement in behavior which the individual may experience, the rate at which improvement takes place, and the degree of retention of this improvement. The individual who has inherited the higher degree of intelligence, other things being equal, will reach a higher limit in the improvement of his behavior, will approach this limit at a more rapid rate, and will retain this improvement over a longer period of time than will the individual who has inherited a low degree of intelligence. What was said in the previous section of this chapter on the absence at birth of specialized drives will hold equally true of the ability for making specialized responses.

The child may inherit a high degree of ability but this ability is generalized. Environment is the factor which brings about the specialization in the responses. Great musicians are made, not born. A great musician is highly intelligent; he has become famous in his art because of his ability and application. But he could have become equally noted in several other lines of activity. He chose music because of certain environmental influences. Inheritance determines the general capacity of the individual, namely, high, low, or mediocre. But it is the environmental influences which determine the one line, among a dozen or more possible lines, along which the responses are going to be directed and perfected.

As in the case of the drive factor, maturity only determines the time during which the environment may operate to perfect the responses. The mature individual will show a higher degree of change or improvement in his behavior than will the younger individual. Up to a certain limit the improvement of responses bears a somewhat direct relationship to the amount of time that an activity is exercised.[13]

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[13] For a complete discussion of measurement the reader is referred to Thorndike, E. L., et al., Measurement of Intelligence, 1926.

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